The Chemical Age

A Weekly Journal Devoted to Industrial & Engineering Chemistry

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NOTICES:—All communications relating to editorial matter should be addressed to the Editor, who will be pleased to consider articles or contributions dealing with modern chemical developments or suggestions bearing upon the advancement of the chemical industry in this country. Communications relating to advertisements or general matters should be addressed to the Manager.

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The Strike.

UP to now we have not discussed the long-threatened coal strike, partly from a humane desire not to add to the week-end worries of our readers and partly, as in the case of the late war, because one had hoped that no class or section would have been mad enough to bring such a disaster about. Those, however, who set the machinery going went too far in this case to retreat, and the strike is now in force. How long it will last it would be futile to guess, but there is a prevalent feeling that it will be of short duration. There is nothing resembling enthusiasm behind it, even in South Wales, whence the trouble mainly emanates. The miners have failed to convince even their own trade union colleagues that there is sufficient substance in their grievances to justify such a blow to national industry. Already, in addition to the miners themselves a serious addition has been made to the army of unemployed. At the end of a week or a fortnight unemployment will be much more general. It is a pity that the innocent, especially the women and children, should suffer, but such experience is necessary to make many realise the subtle way in which the elements composing society are balanced and related. The first effect of the miners' action is to damage most directly the interests of their own class. It is simply pulling down when the condition of the country calls on everyone to be building up.

Perhaps the most significant feature of the case is the calm resolution with which the country is facing the situation. It is to be feared that behind these labour troubles there are insidious forces working for mischief, and the simplest way is to meet and crush them, for they bode no good to any class. Even looked at from the strictly economic aspect, with agitators left wholly out of account, there is a feeling that a limit must be set to the continuous demands for advances of wages. It is already clear that they are in themselves no remedy for the increased cost of living; the remedy lies in increased production of commodities. And when advances of wages are accompanied by deliberate reduction of outlet, it is clear that the men or their leaders are thinking in wrong terms and themselves withholding the only cure for the ills they complain of. The present strike, it is to be hoped, will be an education. If it convinces the nation of the unity of interest which binds national life together and teaches the workers that the more they give to the State the more they gain for themselves in the end, it may furnish some compensations for the heavy damage and inconvenience it is inflicting on us all.

Chemistry and Dyeing

LORD MOULTON'S presidential address to the Society of Dyers and Colourists, at Bradford last week, covered considerable tracks of ground which at different times he had traversed before, but the conclusions forced upon him by his exceptional experience during the war will bear repetition, in view of their importance, and will, indeed, require to be many times repeated before their importance is fully appreciated in this country. What Lord Moulton recently told the chemists and chemical manufacturers of England he has now told the dyers and colourists of Yorkshire—that they do not realise the importance of their own industry to the nation. He was speaking, of course, not to the manufacturers of dyestuffs, but to the actual users of dyes. The obligations which rest on the former to make this country independent of foreign supplies, and the duty which rests upon the Government and the public of giving them the fullest support, mingled it may be with a little occasional criticism of a constructive character, have been freely emphasised of late. But the men who use the dyestuffs in our great textile industries and in other directions—contributing in that way to the maintenance of our export trade—are, in Lord Moulton's opinion, not less in need of the science of chemistry. For successful dyeing is to him a matter of refined chemistry, and he pleads for a closer and more sympathetic relation between the dyers and the chemists of this country.

What Lord Moulton said of the dyeing industry—that it had followed rule-of-thumb too much in the past—might, we fear, be said with equal truth of most British industries. Rule of thumb, after all, is not always the blind haphazard method it is represented to be. It is unconsciously based on a large fund of accumulated experience; in other words, on practical experiment, which is the final test of theoretical conclusions. To this extent it is good and sound, and in alliance with our strong business sense it goes far to explain the excellence of British productions. Where it falls short is in a scientific understanding of the why and wherefore of actual processes. The workman who has merely learnt how to do things is only half-equipped until he has also learnt why they are done. It is in the latter direction that our technological education needs to be developed. Only so can we hope to maintain and improve our standards, and especially add that extra touch which Germany on so many occasions found it commercially profitable to strive for, but which British competitors too often regarded as not worth while. An industry spoon-fed, even with the best empirical knowledge, is not secure; those who order its technical processes must understand them scientifically as well as in works practice.

In pleading for a fuller application of chemistry to dyeing as to other British industries, Lord Moulton had a good word to say for the industrial or works chemists. There is, of course, no real distinction between pure and applied science, and the research chemist who looks down upon his colleague engaged in industry is adopting a pose for which there is no justification. They merely represent two phases of the same work, and each is the necessary complement of the other. The essential thing is that each should be of the best, and that industry should increasingly recognise the value of both. One step towards this is the provision of better educational facilities, both on the purely scientific and on the technological side. An even greater impetus would be supplied by a more liberal scale of remuneration and by a franker recognition of industry's debt to science. When the chemist has a reasonable prospect of a fair reward for a long and costly course of education and for the extremely responsible character of his duties, we need not fear any serious dearth of properly qualified men. While the reward is as meagre and the tenure as insecure as they too often are to-day, one cannot wonder if the ambitious young man hesitates—to the impoverishment of chemistry as a science and to the obstruction of the scientific penetration of industry.

Electrolytic Iron for Research

Mr. W. E. Hughes who, during the war, was chief research chemist of the Electro-Metallurgical Committee attached to the Ministry of Munitions, contributes a valuable article to a recent number of the *Engineer* dealing with the applications of electro-deposited iron. The principal uses to which electrolytic iron has been put since 1895 are three, namely, its employment as material for certain parts of electrical machines; in building up worn and under-gauge parts of aeroplane engines and, to a lesser extent, of armament; and as material for the carrying out of research work on the properties of pure iron. The first and second applications relate purely to engineering, whereas the third is of almost direct concern to the chemist. The value of electrolytic iron as a material for research work is due to the fact that it is the purest form of iron available. To speak of it as the "purest form," however, must not be taken to imply that it is 100 per cent. pure. A good deal of confusion seems to have resulted from unwarranted assumptions as to its absolute purity, so that investigations which have been carried out on this basis must necessarily be looked upon with suspicion. Mr. Hughes, in fact, states that it is not uncommon for investigators of the physical properties of iron to employ electrolytic iron, taking it as "pure," in the same way that a chemist will take the purity of Kahlbaum's chemicals for granted. Work that has been done on the thermal and thermo-electric properties of the metal, as well as by its corrosion by atmospheric and other agents, has quite often been done on electrolytic iron as the material used. And in not a few cases no trouble seems to have been taken to establish the purity of the deposited metal employed.

In most cases it contains gases, more especially hydrogen, which are particularly difficult to get rid of, while carbon, sulphur, silicon, and phosphorus are found in varying amounts. The moral to be drawn is that electrolytic iron is of value for research work only in cases where the material is definitely shown to be pure. It is doubtful whether chemical analysis is, in and by itself, enough. The iron must in all cases be carefully annealed in order to drive off included hydrogen and, possibly, other gases. It should then be analysed, and, thirdly, it should be subjected to careful microscopic examination. In the present state of knowledge that is perhaps as much as the investigator can do. The ideal will not be approached until patient endeavour has succeeded in producing electrolytic iron of the highest purity and some one, at least, of the properties of this evaluated with a high accuracy that will enable it to form a standard of comparison as to purity. Work is, happily proceeding along both lines of research, and the United States Bureau of Mines are now endeavouring to solve the problem of producing an iron which may really be deserving of the title of pure.

British Research Chemicals

We have received from the Association of British Chemical Manufacturers a pamphlet on British research chemicals, which has been compiled at the request of the Chemical Society and the Institute of Chemistry, and comprises a preliminary list of research chemicals which can be supplied by certain members of the association. It is pointed out in the introduction that the manufacture of fine chemicals is now recognised as a key industry—of vital importance to the welfare of the Empire in times of war, and therefore to be fostered and encouraged in times of peace. The next few years will be a critical period for the industry, and will go far to decide whether it is to be established here on a permanent and successful basis. Unless, in the opinion of the association, it receives sympathetic treatment from the Government

and adequate support from research chemists and the general public, it must inevitably fall back into its pre-war state of comparative insignificance. A list is given of twenty-one British firms who are prepared to supply a considerable r nge of research chemicals, and an additional list is given of certain research chemicals which members of the association are prepared to make if there is sufficient demand. The chemicals mentioned in the pamphlet are made and/or supplied by the British firms whose names are given. All the distributing houses are in possession of this list, and it is interesting to hear that the manufacturers prefer that orders should be sent through the usual trade channels, although in special cases applications may be sent direct to the manufacturers and dealt with according to the custom of the firm concerned. The present list is only a preliminary one, which it is hoped to supplement considerably from time to time. The manufacture of new chemicals will be undertaken by one or other of the firms according to demand, and we learn from Mr. W. J. U. Woolcock, M.P., the general manager, that the manufacturers will endeavour to meet all the requirements of research workers. The Association is anxious to excite the widest possible interest in this subject, and copies of the list may be obtained on application at the offices, 166, Piccadilly, W. 1.

A Successful Club

THE members of the Chemical Industry Club have every reason to be satisfied with the position disclosed in the reports just issued for the past year. During the year 125 new members have joined, bringing the net total, after deaths and resignations, to 715, so that a substantial step has been taken towards the level thousand members aimed at. The treasurer's report is no less satisfactory. The income now exceeds the expenditure, and during the past financial year a debit balance of £55 has been converted into a credit balance of £77. Captain Goodwin is now able to state that the finances of the club are on a sound and satisfactory basis, and this excellent result is due in no small degree to the ceaseless interest he has himself taken in the club's welfare. Apart from these gratifying figures it is satisfactory to learn that the club is becoming increasingly recognised. One significant indication of this is supplied by the action of the Federal Council of Pure and Applied Chemistry. The Council has signified its approval of and sympathy with the objects of the club, and three of its members, Sir William Pope, Dr. C. A. Keene, and Mr. E. V. Evans have been co-opted on the committee A return compliment has been paid the club in the co-option by Mr. Coley on the Federal Council. This may be taken, at least tentatively, as an acceptance of the club for inclusion in the scheme presently to be launched for establishing a central chemical headquarters in London. When Mr. H. E. Coley returns from his tour abroad he will probably find in the admirable statement of the club's affairs awaiting him just the tribute to his own services which he would most have wished for. To the committee, and especially to Mr. Bernard F. Davis, who has taken on Mr. Coley's duties during his absence, these results will be equally pleasant. The club has gone forward steadily since its establishment, and there is every prospect of continued growth and extension. Its success is explained by the fact that it meets a real need and that it has been blessed with unusually capable, tactful, and disinterested management.

No Oils and Fats Monopoly

THE sub-committee recently appointed under the Profiteering Acts to inquire into the existence of any trusts, combines, or agreements in the oils, fats and margarine trade dismiss as impracticable the possibility of a corner in any particular oil or seed by any one of the big groups of manufacturers in the trade. Although there is no sign, so far as the sub-committee has been able to discover, of any monopoly, they recognise a remote possibility of such a co-operation as might be undesirable in the public interest. To obviate this danger what the sub-committee regard as an effective plan has been suggested, namely, that if and when there is any indication of a monopoly in any trade or industry resulting in unfair prices, a committee of traders and of a certain number of Government officials should be set up to fix a reasonable maximum remuneration to be allowed on turn-over in that trade or industry. If a manufacturer or trader should make a profit in excess of that maximum, such excess would have to be paid to the Government.

As to the sub-committee's general conclusions, no evidence was furnished to show that any agreements of the nature of a combination for controlling sources of supply or prices exist between the principal groups of manufacturers engaged in the trade, and the divergent interests and aims of these groups are considered likely to ensure a continuance of sufficient competition to safeguard the public. The sub-committee find that abnormal profits were made when control was releaded, in which all branches of the trade shared. This resulted from the shortage of tonnage and the great demand from the Continent. From April to July of this year there was a rapidly declining market with heavy losses in the trade. During August prices have shown some slight recovery, but there is nothing to point to any appreciable permanent rise.

The Calendar

Oct. 25	Faraday and Physical Societies: "The Physics and Chemistry of Colloids and their Bearing on Industrial Questions,"	Institution of Mechanical Engineers, Storey's Gate, London.
27	Institute of Metals: "Some Notes on Foundries and Production," by Lord Weir.	Institute of Engineers and Shipbuilders, Scotland.
28	Chemical Society; Fischer Memorial Lecture by Dr. M. O. Forster, 8 p.m.	Institution of Mechanical Engineers London.
28	Manchester Municipal College of Technology (Dept. of Applied Chemistry): "Use of Autoclaves in Chemical Processes," by T. Callan. 6.30 p.m.	Manchester.
29	Chemical Industry Club: Annual General Meeting. 8 p.m.	2, Whitehall Court, London.
30	British Association of Chemists: Annual General Meeting, 3 p.m., followed by Annual Dinner.	Midland Hotel, Manchester.

The Design of Mechanical Filters

By Mr. Balfour Bramwell, M.I.Mech.E.

The first of the new course of lectures on chemical engineering subjects, arranged for the Michaelmas term at the Manchester College of Technology, was delivered on Thursday week, when Mr. Balfour Bramwell dealt with the subject of "The Design of Mechanical Filters." There was a good attendance, and the course promises to be a great success.

THE opening lecture of the new series on Chemical Engineering Problems was delivered by Mr. Balfour Bramwell, M.I.Mech.E., at the Manchester College of Technology, on Thursday, October 14, his subject being "The Design of Mechanical Filters."

The Principle of Sand Filtration

Mr. Bramwell, who is well known as the representative of the Turn-Over Filter Company, of Belfast, before explaining the actual design of mechanical filters, dealt generally with the principle of sand filtration. Mechanical filtration probably received its designation on account of its contrast to the common large area slow sand bed, which was entirely of masonry construction, except for the valves, pipes and fittings, whereas the mechanical filter was usually constructed either of steel or iron, and generally embodied designs of a mechanical nature provided for the process of cleansing of the bed. Slow sand beds were always open, whereas mechanical filters were made both open and closed, the closed ones working under pressure of water in the main supply pipe. The actual process of filtration was practically a straining action, although there was supposed to be a slight chemical action. In slow sand beds the action was dependent on the natural impurities strained out of the water, chemical treatment being very seldom used; whereas in rapid filters the action was almost invariably assisted by chemical precipitation treatment.

Present-day filtration was greatly dependent upon chemical knowledge of the water and chemical treatment. The straining action in a slow sand bed was confined almost entirely to the surface layer of sand, and although the thickness of the layer could not be very accurately determined, it was practically confined to the first half inch of sand. The sand used was also slightly finer than that used in mechanical filters, the latter operating approximately 40 times as fast as the former. In the case of rapid mechanical filters the whole depth of the bed came into operation before the time for cleansing, the impurities having gradually forced their way deep down into the bed, though the filter must be cleansed before they would actually come through in any reasonable period of working.

Cleansing

Cleansing was undertaken when the loss of head amounted to a figure which indicated its necessity. What must be aimed at in determining the capacity of a filter to deal with a certain water, the maximum allowable loss of head, and the length of period between the times of cleansing, was that the maximum loss of head allowed should not be reached before there was any sign of the impurities coming through the bed. Slow sand beds generally worked for months without cleansing or scraping, but the rapid mechanical filters were usually designed so that the cleansing process was carried out in the case of waterworks once per 24 hours, or sometimes once every 12 hours, and in the case of filters for industrial purposes once per working day, or in some cases once every six hours. The slow sand bed had a capacity approximately of 2½ gallons per square foot of superficial area, whereas the most economical and satisfactory speed for design of rapid mechanical filters was 100 gallons per square foot when dealing with the purification of ordinary average waters. With a better class of water this speed could be increased 20 per cent., and it was not uncommon, but could not be recommended, to find filters that were being cleansed every six hours working to a speed of 140 gallons per square foot.

Dealing with the common theory of surface film on a filter, Mr. Bramwell stated this was very misleading, and was certainly not at all applicable to rapid filtration. It might apply somewhat to a slow sand bed, where the straining action was confined almost entirely to the surface of the bed. There was no doubt that slow sand beds were much more sensitive than rapid filters, this extra sensitiveness being due to the fact that the straining action was confined to such a thin layer of filtering material. Agitation of the surface of the bed was beneficial, and there was one design of filter upon the market at the present time the operation of which resulted in a continuous cleansing of the surface material. There was always a "bed" underneath the surface agitated which prevented impurities passing through. The whole bed of the filter must, however, be cleaned periodically.

Chemical Treatment

In early days there was considerable prejudice against chemical treatment. It was now known to be really beneficial to the water, as practically speaking it was not possible to get a natural water which fulfilled every requirement. In the case of many waterworks chemical treatment was applied to the water without filtration. The time for action of chemical treatment was most important, and was a very sadly neglected matter. Although it was an expensive matter to instal large sedimentation or coagulating tanks, they were always beneficial and generally worth the money. In this country water was often collected in large reservoirs and often did not require further sedimentation; but abroad, where generally the source of supply was a large river, primary coagulating and sedimentation tanks could not be dispensed with. Sedimentation tanks threw down practically 80 per cent. of suspended matter. The order of treatment was also important. Drinking water should be first clarified by efficient filtration and sterilisation should be effected afterwards if possible. It was of absolute importance in the purification of drinking water to have efficient filtration.

Function of a Filter

The function of a filter was to arrest impurities in the water and to allow the water to pass freely through. The most efficient filter was, therefore, the one in which the bed held the impurities and got dirty, and the best filter was the one which could do this and had a cleansing process that restored the bed each time the operation was performed to its original state. It was, therefore, quite evident that everything depended upon the cleansing process. There were, of course, other considerations; but the most important one was an efficient cleansing of the bed as uniformly through the whole depth as was possible. The periodic cleansing also must be complete from top to bottom.

At every periodic cleansing of a mechanical filter the whole bed should be disturbed and uniformly agitated and cleansed from top to bottom. Unless this was done with absolute uniformity, some of the impurities were left behind in certain portions of the bed, and over extended periods of working these impurities accumulated and formed dirty spots in the bed. Decomposition of some of these impurities took place and the filtrate was affected. Such effects were not so easily visible when dealing with comparatively good waters, but when filters were used for purifying really bad waters the difficulties became much more apparent, especially after the filters had been at work some years, and it was after years of use that the good points in design of a mechanical filter were appreciated.

Cleansing Methods

Mr. Bramwell then referred to various methods of cleansing in several successfully operated filters in use, each having to all appearances some distinctive design, and explained the systems of revolving arms or rakes, steam and compressed air, &c., which were used for the purpose of agitating or lifting the filtering material. These devices all depended upon a voluminous reverse flow of water. The "turn over" principle was really the only one by which there was a breaking up of the whole bed without a voluminous reverse flow, the whole chamber of the filter being made to revolve slowly like a sand or ore washer, or any common revolving washing machine. In all other filters the reverse flow had to be concentrated by means of restricted orifices, and without such reverse flow under a considerable pressure cleansing could not be efficiently effected, as the revolving rakes, arms or impellers could not be worked. In the case of air or steam injectors a reverse flow of air or steam through the bed was useless without a volu-

minous supply of water. The effect of blowing air or steam through a filter bed without a reverse flow of water gave an erroneous impression of great agitation; really it was only a surface agitation of the water on top of the bed.

The "Turn-Over" Principle of Cleansing

In the "turn-over" filter, by revolving the whole of the filter chamber to upset the whole filtering material only a comparatively slight reverse flow of water was necessary to wash the impurities to the surface of the bed. The method adopted for cleansing was really the crucial feature. Nozzles and restricted openings were required in the case of all mechanical filters depending upon a voluminous reverse flow of water to lift and ease the filter bed, for the purpose of concentrating and giving force to the reverse flow of water. These restricted openings had a tendency to fur up and clog and increase the loss of head in the filter. There were no nozzles at all in the bottom of the "turn-over" filter. The bed rested upon a double thickness of perforated plates with holes superposing having sandwiched in between them a fine mesh of strong copper or bronze gauze. The area through the bottom was nearly equal to the area through the perforated plates and was very large. The gauze was well supported, and only exposed in the perforations, which were half an inch diameter. There was no restriction to the passage of water, and practically no loss of head from this cause. The "turn-over" filter was made in sizes from 3 ft. 9 in. diameter up to 8 ft., and of various lengths.

Illustrations were thrown upon the screen showing the evolution of the filter from its earliest inception to its present-day high state of efficiency. The sides of the filter chamber were curved or spherical, and had the same beneficial packing effect that cone sides possessed, and prevented creeping. There were no working parts for the cleansing process inside the filter, and those working parts provided were easily lubricated and kept in order, this resulting in a saving in upkeep cost. The life of the copper gauze averaged five or six years, and it cost only a few pounds to replace, the actual operation of replacement being quite simply and easily performed without removing the filtering material. The bottom of the filter and the gauze could be washed with a hose at any time and inspected without removing the filtering material. The smaller sizes of filters could be easily revolved for cleansing by hand. The power required for other sizes from 5 ft. up to the largest—8 ft. by 21 ft.—varied from 1 to 10 electrical horse-power.

Somewhat larger power must be allowed if a gas or oil engine was used. There was practically no loss of filtering material in the cleansing process, because, unlike other filters, in which the wash-water was being discharged at the same time as it was being allowed to flow into the filter chamber, the filter was specially arranged so that it was impossible to inject and eject the wash-water from the chamber at the same time. By this arrangement it was possible to place the discharge opening for the dirty wash-water close down to the surface of the bed, and therefore get rid of the dirt more thoroughly and rapidly by syphoning action. The cleansing and getting rid of the dirt was thus obtained with a minimum expenditure of wash-water, and there was a thorough and uniform cleansing of the bed itself. "Turn-over" filters were being used with great success not only for purifying river and moorland water for town water drinking supplies, but for clarifying water drawn from dirty rivers for industrial purposes in place of town supplies, and for purifying water in swimming ponds.

Filtering Material

The best filtering material was undoubtedly crushed quartz, because it was hard and sharp and less liable to trituration, and was practically non-absorbent. Natural sand gave the same filtering efficiency, but it did not clean quite so well owing to its rounded particles, neither did it pack so well. It was absorbent, and most of it was composed of a soft, triturable material. Quartz was, however, very expensive and difficult to procure at the present time. All material, whether mechanically crushed or natural, should be free from dust or very fine particles, and should, therefore, be riddled. The grade of filtering material should be as uniform as possible, though in practice absolute uniformity could not be expected; therefore a system of cleansing which involved a reverse flow of water at such a high head and of so great a volume that it threw the finer particles of the filtering material to the surface was distinctly at a disadvantage.

Distribution of Dirt

An examination of filters with straight sides showed that there was much more dirt arrested in the filtering material close down the sides of the chamber than elsewhere, which was distinct evidence of what had been termed "creeping." As further proof of this "creeping," it was well known that in ordinary slow sand beds the sand was found to be dirtier down the straight sides than at any other point in the bed. The conclusion, therefore, was that there was no better design of filter chamber than a curved or spherical surface, for two reasons—namely, that this shave of sides reduced "creeping" and also assisted materially in the packing of the bed. Although a coned side had a beneficial effect in stopping "creeping" and packing of the bed, due to the increased depth of bed in the direction of the steam lines of water, and due to the better packing effect, it could easily be seen that a coned side was not so good as one which was curved or spherical, because the effect of "creeping" with the curved or spherical sides was less on account of the fact that the stream lines from a point on the surface of the bed next the side of the chamber must pass through the filtering material, as the water travelled a straight path and not round the curve of the side of the chamber. A portion of the bed was thus left as a packing.

Mr. Bramwell particularly referred to the inferior results obtained from very small diameter sand filters, and said he could not recommend less than 3 ft. Their failure was due to the high percentage of creeping and poor packing. Small glass tubes are useless for laboratory purposes, it being far more accurate to use filter papers for experimental laboratory purposes.

Types of Filters

During the course of his lecture Mr. Bramwell described in detail, with the aid of screen illustrations of a diagrammatic nature to illustrate the various cleansing arrangements, the American type of open and closed filters, the Reeves closed and open filter, the Reisert filter, whose arrangement for cleansing is used by several present-day manufacturers, the Bell, Mather & Platt, and Ransome. Photographs were also shown of the "Turn-over" filter.

Dyers and Colourists: A Vigorous Organisation

THE visit of Lord Moulton, the president of the Society of Dyers and Colourists, to Bradford on Friday last, opened the new session of the West Riding section, for which an ambitious programme has been prepared. The syllabus of lectures shows a material extension of the scope of the West Riding section's activities. Whereas in the past attention has been devoted chiefly to problems in the dyeing and finishing of wool and cotton textiles, lectures have been arranged for the coming session by leaders in the industries concerned on the dyeing of paper and silk, as well as a wider range of subjects in relation to wool and cotton. Developments in colloidal chemistry are to be studied, and there are to be visits to Leeds and Halifax, in addition to the Bradford gatherings. Huddersfield, as the centre of a great dyeing industry, has now its own section. Special attention is being given to the junior section, in which Yorkshire has taken a lead, being the only section of the Society with a separate junior branch, though everything points to Manchester following suit very soon. Since the Armistice, with the return of young men from the forces, there has been much propaganda work on behalf of the junior branch, and the membership has been increased from 150 to 350. The Society is stimulating interest in its activities amongst young men leaving the Leeds University and the colleges and in works' laboratories, as well as amongst apprentices. Research is encouraged, and, in addition to special lectures for the juniors, there is a competition for an annual prize for papers by the young men. Mr. G. G. Hopkinson is the chairman of the Yorkshire Junior Society, and is a very "live" leader. Bradford's junior society is presided over by Mr. Fred Smith, and Leeds junior society has the advantage of the chairmanship of Professor A. G. Perkin, of the University. It is intended to hold meetings during the session at Halifax, Huddersfield, Batley and other places, with a view to the formation of local junior sections. The Bradford society has arranged for the establishment of a club at the Midland Hotel, with a technical library and provision for social and educational intercourse.

Chemical Science in the Dyeing Industry

Lord Moulton's Presidential Address at Bradford

In the Council Chamber at Bradford Town Hall on October 15, Lord Moulton delivered his Presidential Address to the Society of Dyers and Colourists, delayed owing to his inability to attend the last annual meeting of the West Riding Section. The Lord Mayor of Bradford (Ald. Wade) presided, and among those present were Messrs. C. R. Hindley, Dr. Alfred Ree and George Douglas (Past-Presidents); Arthur G. Green, Ernest Hickson, E. T. Holdsworth, Dr. E. Knecht, and Thorp Whitaker (Vice-Presidents); John Denton, E. Fyleman, H. Jennings, J. C. Oxley, F. Smith, Robert Turner, W. A. Edwards, J. Campbell Gray, G. G. Hopkinson (Member of the Council), J. R. Denison (hon. Treasurer), A. Silverwood (hon. Secretary), and J. B. Atkinson (Secretary).

The Lord Mayor, in welcoming Lord Moulton to Bradford, said that his name was known throughout the scientific world. Bradford had taken no small part in the supply of picric acid during the war, and the connection between picric acid and dyeing was closer than was commonly thought. He trusted that the Government and the scientists of this country would not rest until we had become self-contained in the production of dyes and able to manufacture every colour required by other industries.

Oldest Chemical Trade in the World

Lord Moulton said it was not only a great honour, but a very welcome honour to be the President of the Society of Dyers and Colourists. He could, of course, boast of having had a most intimate connection with the dyeing trade during the past six years, and that only came at the end of a long period during which he had taken great interest in their work. He was convinced of what a valuable asset to the country the great dyeing trade was. He believed he was addressing the oldest chemical trade in the world. There always had been a great industry in colour, which deserved to be called a great chemical industry. It was a great triumph to be able to make dyes effective by the use of mordants which were thousands of years old. How these things were discovered one could not tell, but the human intellect had been working at colour from the earliest times and mostly it had been colour in textiles. He was now addressing an industry which, in their lifetime, had taken a leap forward which threw into the shade all it had done in the past. That did not remove their obligations to the ancients, for some of the dyes used to-day were as well-known in the old days, and as successfully used, as at the present time. This great leap forward they owed to the use of the products which they now knew as coal tar products. Many of the best colours were produced from that very unlovely source.

Where he found fault with the dyeing industry was in the fact that the dyers had not asserted themselves sufficiently as a great chemical industry. They had allowed themselves to be put in a position rather menial, as though they were only just persons who assisted the chemists in their great work. That was not the view he took himself. Final success or failure depended on the men of the colour industry. It was the neglect of the fact that it was the skill of the dyer which made the skill of the chemist reliable and the basis of an enormous industry that he wanted to call their attention to. If they realised that failure in dyeing, the very slightest, brought loss with it in the cost of the dye and of the labour used, and the far greater cost of the textiles on which they were operating, they must feel that the aim of successful dyeing was paramount. Successful dyeing was a matter of refined chemistry. On the successful use of that chemistry depended not only the dyers' own success, but that of the nation's export trade, and its import trade in textiles.

Too Much Rule of Thumb

He thought the dyers were to be criticised, if an outsider might pronounce an opinion on such a subject, because they had followed almost too much the English method of working purely by the results of experience; they had adopted too much the rule of thumb method, clinging to that which had succeeded, and they had not appealed to the assistance of science so much as the magnitude of the task warranted. The success of Englishmen in industries, which had placed them at the head of nations for the time being, had generally been due to their extraordinary power of working by experience without conscious knowledge. He could not give a better example than that of the potteries. The potteries, with very few though great exceptions—at all events until recently—had depended almost entirely on the hereditary skill of the workmen who for generations had been employed there, and the position of England with regard to pottery was due to the merits of those men. But he wanted the dyers to realise that success of that kind was not the end of their aims. It ought to be the foundation on which science and accurate observation built to higher triumphs which must be won if England's place in the various industries was to be maintained.

He wanted to see a far closer union between the dyers and the chemists; they must go to the chemists, not as outsiders asking for assistance, but as a brother chemical industry desirous of getting all the additional information required to secure further success. He could not help feeling that there was a tendency in the dyeing industry to content itself with results, without knowing exactly how or why those results were obtained, and without bringing to bear upon the various problems—which were intricate and special—that closer investigation which science, when applied to industry, brought with it. Nothing was so certain to make short-lived the supremacy of an industry as allowing itself to be spoon-fed; allowing itself to be told what to do without mastering the why and wherefore.

Lessons from Germany

He was struck by that fact when he went through the list of stocks of the German dye companies in connection with the clauses of the Peace Treaty. By such clauses England had a right to one-half of every dye the Germans had in stock. In that list he saw stocks of dyes whose names showed that they were substantially the same dye, but there would be some tag to the name which distinguished it. These were names on no lists for sale. They were represented by two or three pounds or something of that kind in the stocks, and it seemed to him perfectly evident that these were special blends marked down for special customers solely. The consequence was that they were of utterly unknown consistency and structure—mere blends. If dyers, taking the great standard dyes, could not, without the assistance of some private firm, work with them, they were accepting an absolute dependence on that firm, from which it would be impossible to shake themselves free. He had heard that the German firms had been eager enough to send over and teach the use of some particular dye to the persons who would buy it, and in that way they secured that ever afterwards those users would come to them for that dye. If the great dyeing industry of England was not going to be independent of such extraneous aid—if it was not willing to learn how to do its own tasks, to develop by scientific investigation and by experiment, the best methods of use of these dyes—it could not give to England that which was necessary for its prosperity, because always it would be dependent on its nurses. It might be that in saying these things he was using terms which applied only to some small portion of the industry, but he commented on the matter because he had known other industries which had been content to take manufactured things from outside, without taking the trouble—although they were themselves makers—to find out how the things were made.

When the war broke out his first employment was to study all the things in which England found itself short, because it could no longer get its supplies from Germany. He had been astonished to find that in many things in which we were producers the highest quality came from Germany. He asked the makers, "Why is this? Why cannot you make it as fine as the German products?" They could not give a reason, but fortunately the reason was forced upon them, because when they could not get the stuff from Germany they had to turn to and make it themselves. Again and again he had had the pleasure of the manufacturers coming back with specimens which were as fine as anything ever made. The fact that they

were driven to their own resources made them discover the manufacture of the things. In all these industries what he wished was that the industry should feel its great glory was in its success and its independence, and he was satisfied that if those points were before the eyes as joint aims the dyeing industry would grow more vigorous and there would be no fear of rivals ever displacing it from its high position.

Not Enough Science in Industry

He was afraid there was not quite enough of science brought in by the industry itself. Whether there was or was not, he wanted them to feel that they had to regard themselves as a great chemical industry, and that they must ally themselves with the other industries in developing chemistry in England. The war had taught us that every nation must be prepared at a pinch to stand alone, and it had taught us, also, that of all the industrial sciences the most important and the one which England had most neglected was chemistry. He thought that had been due largely to the fact that chemists had not asserted themselves sufficiently. They had been broken up too much into laboratory chemists and chemists of other kinds. The chemistry that underlay them all should be a bond between them all, and he hoped and trusted that the chemists of England, including all the industrial chemists, would make the country feel what an enormous importance was attached to chemistry, and how those who practised it should be honoured and assisted. If he were to ask the older people present as to the way in which chemists had generally been regarded in the industrial world hitherto he fancied he would get an answer that the chemists were somewhat looked down upon. He did not mean to say the great chemists who were at the head of inventions which had created industries; but the men who took up chemistry as a livelihood, as a rule, had very little prospect before them.

In Germany the opposite was the case. The close examination of special problems in industrial chemistry was exactly the type of work which suited the German intellect. They came over to England and learned what they could from our successful manufacturer, and then they went back and examined each point in order to find the scientific reason for the success, and how it could be improved upon. He remembered one industry in which he found that the German manufacturers sent their children to study in this country, after passing through a course of chemistry, and then they went back and took places with their fathers in the manufacture. Too frequently, the English head of the firm thought it was not necessary for him to know these things. He just left it to the chemist, and did not really trouble himself, not realising that the other people were using what he had done as a starting-off point for what they were about to do. In Germany the close devotion of both masters and employees to the examination of the causes and the methods of success had led to productions in Germany which before the war England could not rival.

Late War Based on German Chemistry

We in England were cured, to a great extent, by the war. He hoped to see this country cured entirely, but it would only be by the chemists of England—the industrial as well as the laboratory chemists—being recognised as one of the great sources of national success. They had not looked upon chemistry as one of the great sources of wealth. They had looked upon iron and had made wonderful advances in it. He did not mean to say that there had not been splendid work done in the heavy chemicals, but that was not sufficient. When he had looked round for chemical works in which to make explosives, and later on to make toxic gases, he had found a terrible dearth of works suitable for organic chemistry, and although he quite agreed that they must feel all gratitude to picric acid and to the Yorkshire manufacturers of it in the way they assisted, yet that was only one of many ways in which they had sought for chemical industries which could be turned to the assistance of the nation in time of war. They were now finding that chemistry was going to be as important to the success and the wealth of the nation in peace as it was important for defence in war. They must realise that the whole of the late war was based on German chemistry. But for the triumphs of German chemistry—which we did not imitate—the war must have been over in three or four months. The Germans could not get a ton of nitrates because we ruled the seas, but they made their nitrates at home by their chemical methods, and the consequence was that they had all they wanted and there was no possibility, by any blockade, of limiting them in the one great essential for explosives. That was entirely due to their chemical success. That very same success was going to decide on our own entry into the field of fertilisers, necessary beyond all compare in England, and which would be one of the great exports to all countries which were themselves not developed in chemistry. So we must look upon the development of chemistry in all its branches as a thing necessary for our nation's prosperity. He wanted to impress on the gathering that they could not do this without developing chemistry in the education of the country and in the appreciation of the country. Chemistry must take its proper position as being the most magical science of to-day.

Perhaps he himself thought, to some extent, from the bellicose point of view. He thought of what the next war would be. This late war was very nearly a chemical war; it rested entirely on chemistry for the substances used, though always it depended on England's great iron industry for the means of using these substances. But when he came to think of the next war, and when he realised what the first attempt at using toxic substances meant and what it did, and when he realised that these could only be made by chemistry, if there should be another great war recourse would be had to them first of all, and that nation would have the greatest advantage which had chemical industries capable of supplying the need. If such a war should break out and find England in the state of nudity in which we were at the beginning of the late war, long before we could meet the danger the war would be decided. He did not say supply the need in times of peace, but the infinite adaptability of chemical apparatus should give us the power of doing it when necessary. It was absolutely essential to the nation in wartime that there should be well-developed chemical industries in abundance in order to take on the tasks that the war would most certainly throw on their shoulders. Moreover, it was a sad thing to think that when industries had become dependent on chemistry they should pass away from a nation that had shown itself such a brilliant success in chemistry, and had started so many of the great lines in which chemistry had developed. The dyers must think of this not only from the point of view of being a great chemical industry themselves, but they must recognise that England had to be made a great chemical nation, and they must not rest in their efforts until that was the case.

The Claims of Industrial Chemists

The education of chemists was now proceeding vigorously in England. The Universities were turning proper attention to chemists, and there would soon be plenty of young men who would be well fitted for all the tasks that the chemical industries could put before them. The chemical industries must be ready for these men. The chemists of the country must all work together and, above all, it was essential to remove all idea that industrial chemistry was inferior in any way to laboratory chemistry. The tasks were not the same. Industrial chemistry such as that which was the work of the Society of Dyers and Colourists was that which ultimately produced the wealth and prosperity of the nation, and such chemistry must be duly honoured and duly studied.

There had been a tendency in England to look down upon industrial chemistry as though it were inferior to the chemistry of pure research. They must get rid of ideas of that kind, and it could only be done by the great chemical societies, in which he included the Dyers and Colourists, insisting on the chemists being recognised and bringing their great influence to bear to see that the teaching of chemistry was suitable to their needs.

Replying to a vote of thanks proposed by Mr. E. Hickson and seconded by Dr. Alfred Ree, Lord Moulton said he believed the Society of Dyers and Colourists had an influence which it scarcely realised on the question of chemistry in England. It had probably a great influence on the choice of the dyes of the future, and he believed that a permanent industry in export which was absolutely necessary to keep England alive in such a thing as textiles, could be got only—if only slowly—by the choice of the best dyes, and the gradual weeding out of those which would not improve the reputation of English goods.

On the motion of Mr. C. R. Hindle, seconded by Dr. F. Mullwo Perkins, the Lord Mayor was thanked for presiding.

Physical Chemistry of Paint

Mr. Britton's Paper Before Oil and Colour Chemists

AT the first meeting of the session of the Oil and Colour Chemists' Association—Dr. R. S. Morrell (president) in the chair—Mr. R. P. L. Britton read a paper, entitled "A Contribution to the Physical Chemistry of Paint and Varnish."

Starting from the point of view that the problems met in the paint and varnish industry are frequently incapable of explanation on principles of pure chemistry, the author endeavoured to indicate, without attempting any broad generalisation, the extent to which such problems can be best referred to physical chemistry for explanations. Physical chemistry, he said, taught us that some of our ideas in regard to molecular physics must undergo slight modification. Thus, dealing with homogeneity, sulphur whilst being chemically identical, might physically be discrete. It might consist in part of plastic, rhombic or monoclinic. The water might consist in part of associated molecules of 2, 3 or 10 times the molecular weight, and thus in chemically homogeneous substances we might get physical heterogeneity. The next concept was that of homogeneous solutions. Here we got a similarity of ideas, for in a true solution it was immaterial where a portion was abstracted from or how the solution was sub-divided, the resulting chemical composition was the same down to infinitesimal magnitudes. But here, from the study of the speeds of ionic migration we learned that the ions themselves were frequently hydrated and carried with them a water atmosphere of their own which remained separate from the main bulk of water. Thus in true solutions we got the same idea of chemical homogeneity and physical heterogeneity.

Molecular Dispersoids

Turning from the ionic solutions to the molecular dispersoids, we approached conditions more analogous to those met with in the paint and varnish industry. These true solutions gave osmotic pressures in proportion to their molecular weights. The ionic solutions on the one hand gave osmotic pressures which were extremely high, shewing dissociation in the molecule, whereas many of the solutions paint and varnish makers had to deal with showed very small and often negligible osmotic pressures, indicating association in the molecule. This molecular association needed careful consideration because it carried with it the idea of active and inactive liquids. The conception of active and inactive solvents required still further examination because concentration of solution had a great influence on the association. The solutions they themselves worked with were always of a concentrated type, and the greater the association in the solution the more did it depart from the type of true solution on which the reactions of pure chemistry were founded, and the more it approached the realm of colloid chemistry.

Another case to consider was that of a solid immersed in a liquid. This solid would possess its own surface tension, and would be acted upon by the surface tensions of the liquid surrounding it, and there would also be a third surface tension exerted at the interface. In accordance with the law that systems tend to arrange themselves so that their energy is a minimum, the surface tension of the solid would tend to become smaller and smaller since the solid not being deformable would possess a constant surafce. This, then, would be the difference between liquid-liquid and liquid-solid tension, and as substances adsorbed at the surface of the solid tended to lower the surface tension, pigments in a disperse system formed ready boundary surfaces at which the adsorption might take place. Such tensions were most important in the case of emulsions and water paints, and they were also of extremely great importance in most of the paint and varnish makers' problems. Thus, the inter-facial tension between pigment-oil or pigment-varnish mainly determined the ease with which a pigment could be wetted or saturated with the medium in which it was ground, and this again was a great factor in determining the fineness of grinding which was produced in enamels, a subject which had been dealt with by various workers as far back as 1911 and 1912.

Again, many colloids were electrically charged and this fact might have some bearing on the matter of surface tension, since the nature of the change would determine whether the interfacial tension be raised or lowered. Also, the surface tension would in general be lowered by a rise of temperature. It was well known that there existed a critical temperature, at which solution in many cases took place, and it was also well known that if, when solution had taken place, the temperature be lowered below the critical value it was possible to obtain the substance in colloid suspension.

This fact was responsible in many instances for abnormalities which occurred in varnishes, particularly with reference to driers. It was this which explained the fact that excess driers caused a retardation because above the critical temperature the acceleration was normal. Bancroft, in dealing with greases which had a composition of rape seed, calcium soap, water and mineral oil, described them as salve-like emulsions of a super-cooled solution of lime, soap. together with the precipitated lime soap and a little water. This was, so far as he was aware, the first mention of the idea of supercooled solution as applied to the problems with which paint and varnish makers had to deal. Van Weimar, in enunciating his theory of colloids, emphasised the fact that the colloid properties were the attributes of a state, and not of specific materials; that we should properly speak of the colloidal state and not of colloids as a class. The phenomena of superfused solids had been investigated by numerous workers, and viscosity had come to be regarded as an important criterion of the passage of a liquid into the crystalline condition. Certain substances such as pitch, resin and asphalts, were in a state of unstable equilibrium, and their stability would depend on the amount of energy which was rendered latent in their formation.

Discussion

The PRESIDENT said that the paper really opened a discussion on colloids, and when they remembered the problems which the paint and varnish maker had to deal with, the outlook was appalling. His own impression was that physical chemistry would have to go a very long way before it solved these problems. Take, for instance, the study of surface tension. It had been his fate during the past six months to investigate the surface tensions of the substances met with in varnishes, and he had found that the experimental conditions were extraordinarily difficult. The slightest quantity of impurity would disturb the conditions, and the conclusions to be drawn from different experiments made under presumably the same conditions were quite different. It was for this reason that he was sorry to say that physical methods were of very limited application. Recent work had shown that mineral hydrocarbons were by no means as inert as one would wish them to be. They had very peculiar properties which must be connected in some way with their chemical composition, and he did not think they could eliminate chemical composition in any of these problems of surface action. The activity of a varnished surface was decidedly dependent on its chemical composition, and the two had got to be worked together. We must not rely too much on physics. The study of colloidal chemistry was an exceedingly interesting subject, and the paper had opened up a number of interesting and important questions in that connection.

Dr. GOLDSMITH said it seemed possible from the paper that colloidal chemistry as applied to paints and varnishes would yield results of unexpected value and interest.

Mr. H. MORGAN, whilst welcoming the paper, did not quite agree that physical chemistry was the panacea for all the ills in paint and varnish manufacture.

Mr. A. E. DE WAELE regarded the paper as an exceedingly good summary of the situation.

Mr. A. MOLTENO agreed that undoubtedly some of the phenomena in the paint and varnish industry could not be explained by pure chemistry, and, in his opinion, the use of physical chemistry was not only desirable, but essential. Why should they wait for a research association to be formed? They should all do their best individually to get deeper into the subject of surface tension and colloidal conditions, instead of waiting for the research association.

Mr. BRITTON, in a brief reply, said that in the old days nobody bothered about physics; chemistry was called upon to solve all problems. That state of things could not hold to-day, but he did not say that the chemical constitution had no bearing at all on the physical properties. He agreed that there was at present no satisfactory method of measuring the interfacial tension between a liquid and a solid, but such a method might not be very far away.

"The Gases Dissolved in Water"

Streatfeild Lecture by Mr. J. H. Coste, F.I.C.

In his Streatfeild Memorial Lecture on "The Gases Dissolved in Water," delivered on Thursday, October 14, at the City and Guilds Technical College, Finsbury, Mr. J. H. Coste, F.I.C., said it had been generally realised that water freed from air and then exposed to and even shaken with air required a rather long period of saturation, although the amount of air taken up was very small. All works on the rate of absorption or escape of gas from water, from whatever point of view undertaken, led to the conclusion that the reaction between a liquid and a gas followed the same course as those between other heterogeneous phases. In the case of a gas over perfectly still water, the surface rapidly became saturated; in fact, there was good reason for considering the surface interchange to be instantaneous, but the downward diffusion of the gas in the liquid was slow, and proceeded more slowly as the depths were reached, owing to the decreasing pressure due to the retention of gas in the upper layers of the liquid. Nevertheless, a continual entry at the surface and procession downwards occurred until the whole of the liquid was saturated with the gas. Very slow diffusion could be supplemented by mechanical agitation, in which case the water could be considered as divided into two layers, an upper one, where the concentration gradient falls off from saturation at the surface to some lower concentration which is uniform throughout the lower part of the liquid.

A Limit to Solubility

There was a limit to the solubility of a gas in water—in other words, for every set of conditions, a point was reached when the water would absorb no more gas. It was clearly necessary to ascertain that point for varying conditions. The determining factors in addition to gas pressure were temperature and the presence of other matter—such as the salts of sea water—already dissolved in the water. Water would dissolve more gas at its freezing point than at higher temperatures. The effect of salts in reducing solubility of gases was well shown in the case of sea water. It was usual, following Bunsen, to reduce the results of determination of solubility of gases to the volume of gas at a pressure of 760 mm.—that is, the gas itself, not gas plus water vapour—which one cubic centimetre of water would dissolve at the temperature of experiment. A few such values were given in the following table:—

	1 c.c. of Water Dissolves					
	0	10	20	30	40	50
Nitrogen	0·0230 Fox	0·0185	0·0155	0·0135	0·0121	0·0110
Oxygen	0·0492 Fox	0·0384	0·0314	0·0266	0·0233	0·0209
Carbon dioxide	1·71 Winkler	1·19	0·88	0·665	0·530	...
Argon.....	0·55 Winkler	0·04	0·035	0·030	0·027	(0·026)

Since air contained only 78 per cent. of nitrogen, 1 per cent. of argon and 21 per cent. of oxygen, with about 0·03 per cent. of carbon dioxide, the amounts of these gases dissolved from it were reduced from those given proportionately to these amounts, and since also air over water was always saturated with water vapour, the amounts were further reduced from this cause. Water dissolved from air just about one-half as much oxygen as nitrogen, so that one gas was a simple measure of the other. The volumes of gases dissolved by water were not large, but the weights were very small indeed. For example, distilled water which was fully saturated with air at 15 c., and normal barometric pressure, contained only one part per 100,000 of oxygen—0·001 per cent. Ordinary river water would dissolve as much, but sea water only contained about 80 per cent. of this amount—0·0008 per cent. Yet these very small concentrations had far reaching effects.

Methods of Determining Solubility

Discussing the methods of determining the solubility of a gas in water, Mr. Coste said the most practical gasometric method for oxygen and nitrogen was Winkler's. The gases were evolved in a stream of CO_2 generated from calcite by hydrochloric acid in the measuring vessel, and collected over potash solution in a graduated tube, in which they were measured, and the oxygen absorbed by "pyro." Oxygen from its great chemical activity, could be determined by chemical means. Of many methods, the best was certainly Winkler's manganese process, which was well known. Carbon dioxide might be determined by the usual method of titration of the base combined with it by acid and methyl orange, and of the free and bicarbonate CO_2 by sodium carbonate and phenol phthalein. Another method was by comparing the tint produced in the water in question by indicators of alkalinity with those produced in a series of "buffer mixtures." Mixtures of boric acid and borax, mono and di-hydrogen alkali phosphates or other salts of weak di- or tri-basic acids might be used. The carbonic acid bicarbonate, bicarbonate-carbonate equilibrium had been studied by Prideaux and others, and the range of alkalinity of such mixtures was well defined. The experiments of passing carbonic acid into a very dilute solution of sodium carbonate coloured purple with a mixture of α-naphthol phthalein and phenol phthaleln illustrates the effect of an increasing proportion of acid to base. First the crimson colour imparted to phenol phthalein would disappear as the liquid became less alkaline by adsorption of carbon dioxide, then the blue of α-naphthol phthalein, which continued until the point of absolute neutrality was nearly reached. We may now add a neutral point indicator, such as neutral red, and watch the gradual reddening as the concentration of carbonic acid increases. The reverse series of changes would occur if air was blown through the acid solution.

Oxygen Essential to Water Purity

Apart from its biological value in conserving higher aquatic life—for a sea without dissolved gases would certainly be a dead sea—Mr. Coste said that dissolved oxygen was of importance in maintaining water in a reasonable state of purity. Although there were strong reasons for sewage disposal by discharge into streams, the introduction into a stream of a great mass of oxidisable matter frequently led to putrefaction and offence. The changes which refuse underwent in a river were, in sum, similar to those occurring in a dust destructor; that is, complicated organic compounds were oxidised to stable and inoffensive products; but since they occurred at temperatures several hundreds of degrees lower the rate was much less rapid, and the intermediate stages were more readily discerned. In both cases a large proportion of oxygen was necessary for the combustion. Nitrogen and argon dissolved appeared to be as inert as the name of the latter implied in natural water, but oxygen and carbon dioxide accounted for much of the geological change which led to the disintegration of rocks and the presence of dissolved salts in water. In a large flask experiment the boiling out of carbon dioxide caused a separation of calcium carbonate similar to that which gave engineers so much trouble when unsoftened water was used in boilers. These two gases were also responsible for much of the trouble experienced in the corrosion of iron and of lead.

Practical Considerations

(1) It was sometimes desirable to accelerate absorption of gases from the air, usually with a view to oxidation of matters in the liquid. In most modern processes of sewage treatment this was done rather by passing air through the liquid in very small bubbles, thereby imparting to a relatively small mass of air a large surface (the usual activated sludge method of diffusing tiles) than by increasing tank area. His friend and colleague, Col. Butler, had suggested for this purpose inverting the process, and spraying small drops of the liquid into air. Another method, when area remained constant, was to promote mixing so as to reduce Brunner's layer of concentration gradient to a minimum. This had been successful at Sheffield.

(2) It was frequently desired, for example, in steam raising to keep out air from water. If air was not already dissolved in the water, the surface of exposure to air, if such could not be avoided, must be kept as small and as undisturbed as possible. The surface temperature might be raised to decrease tension of the air gases, and also their solubility and rate of absorption. If the water already contained air, a rise of temperature or decrease of pressure with increase of surface would aid escape. Condenser water from a steam engine was usually gas free, as it was condensed over a large surface in a partial vacuum. Oxygen could be removed by chemical means. The water of a hot water pipe system had been found to be oxygen free, with atmospheric nitrogen as a supernatent gas in radiators on the top floor of a large building. This removal of dissolved oxygen by corrosion of iron might be regulated at will by using large anodic surfaces of iron in a feed water system. It might be noted that in the lungs, in a sewage works, on a metallic surface, the most active gas of the air (oxygen) only became active when dissolved in water.

Chemical Industry Club

Another Year of Progress

THE Committee of the club in their Report for the year ended August 30 just issued to members, state that there has been a steady increase in the membership during the year, 125 new members having joined, making a total membership on August 31, 1920, of 739. Owing to the regrettable death of four members and a few resignations this total was reduced to 715, leaving a net gain of 101 members for the year. The experience of the past year has shown that the present premises are capable of accommodating a much larger membership, and the committee desire to see a rapid expansion of both town and country membership. They therefore appeal to the members to do their utmost to bring in new members so that the club may increasingly become a living factor in uniting the many and various interests which it represents.

The committee announce that the Federal Council of Pure and Applied Chemistry has signified its approval of and sympathy with the objects of the club, and three of its members Sir William Pope, Dr. C. A. Keane, and Mr. E. V. Evans, have been co-opted on to the committee of the club. At the beginning of the year it was felt that the time had arrived when the amount of work involved in successfully running the club necessitated the appointment of an assistant secretary. The committee were fortunate in securing the services of Captain R. P. C. Harvey, M.C., for this position, and the appointment has more than justified the anticipations of the committee in greatly facilitating the smooth running of the club and in enhancing the comfort of the members. Many members have taken advantage of the improved bed-room accommodation at Whitehall Court, upwards of 350 members having made use of this side of the club during the year. The club has also been of service to several societies, providing facilities for committee meetings during the year. Thus the committees of the London section of the Society of Chemical Industry, of the Society of Public Analysts, and of the Chemical Engineering Group of the Society of Chemical Industry, have availed themselves of this privilege, whilst a conference between delegates of the Society of Public Analysts and the Agricultural Education Association was also held in the club. During the summer meetings of the Iron and Steel Institute the use of the club was placed at the disposal of the members a number of whom made use of the facilities offered.

The second annual dinner is to be held at the Connaught Rooms on November 19, 1920, and it is hoped that members will take full advantage of the greater accommodation by bringing friends. A successful series of monthly meetings was held during last winter, at which interesting discussions on technical and social subjects took place. It is intended to continue these during the coming winter, together with other social activities in the form of tournaments and competitions.

The committee much regretted to lose, early in the year, three of its members, in the cases of Dr. Briscoe and Mr. J. C. Johnson for reasons of health, and in the case of Mr. J. W. Black through his leaving the country. Dr. Briscoe took an active part in the initial stage of the club's development, acting as convener of the entertainment committee. Mr. Johnson did much valuable work in looking after the interest of demobilised chemists, to whom temporary hon. membership of the club was granted. Mr. Black rendered valuable services to the club in many ways, taking a deep interest in its progress and development. To each of these gentlemen the committee tender, on behalf of the club, their hearty thanks.

During the latter part of the year the club has been deprived of the services of the hon. secretary, Mr. H. E. Coley, to whom the club owes so much, and who had to undertake a six months tour abroad. The committee, however, look forward to Mr. Coley's return in the near future and to a renewal of his activities in the club's interests. Previous to his departure Mr. Coley was co-opted on to the Federal Council of Pure and Applied Chemistry. The committee were pleased to obtain the services of Mr. Bernard F. Davis as temporary hon. secretary during Mr. Coley's absence. Once again the committee offer their sincere thanks to those many members who, during the year, have done so much to help forward the work of the club.

Satisfactory Balance-Sheet

Captain C. J. Goodwin (the hon. treasurer) in his report states that the salient feature of the past financial year is that the income of the club has exceeded its expenditure, the debit balance of £55 5s. 8d. shown in last year's balance sheet having been converted into a balance in hand of £77 17s. 6d. The present position and future outlook, he states, may be considered satisfactory. A guarantee fund is desirable, and although the balance sheet shows clearly that it is unlikely that such a guarantee fund would be drawn upon, the committee are of opinion that it is still essential. There is every reason to believe that next year's report will be equally favourable and that the finances of the club are on a sound and satisfactory basis.

The Future of Finsbury College

Views of Old and Present Students

PROFESSOR H. E. ARMSTRONG occupied the chair on Thursday, October 14, at the City and Guilds Technical College, Finsbury, when Mr. J. H. Coste, F.I.C., delivered the third Annual Streatfeild Memorial Lecture. Before the lecture (reported on another page) the Streatfeild Prize was presented to Mr. D. G. Murdock, who gained the honour both for laboratory work and for theory.

The lecture was attended by a number of the earliest students of the college, and in the course of speeches made in support of votes of thanks to the lecturer and the Chairman, strong sentiments were expressed with regard to the threatened closing of the famous Institution. All over the world there are scientists, particularly chemists, who owe their mental equipment for industrial service to the people like Streatfeild and Professor Armstrong, and many other famous men, many now whose names and works alone remain with us as monuments of scientific fame, who made the college what it is. Industry owes much more than any can tell to the men who received their training within those almost sacred walls. Now it is said the college must close, and the unpardonable excuse is said to be lack of funds. Professor Morgan aptly compared the case with that of Westminster Abbey. What would the Nation say if so famous a place were allowed to fall into decay for the want of money? Yet an Institution which was not only an industrial and scientific, and therefore a national necessity, but sacred to the memory of thousands of old students, was allowed to be closed with no more feeling or imagination than is occasioned by the shutting up of a bankrupt picture palace. Surely this is another example of British apathy toward those who give of their best in the Nation's interest.

Professor Armstrong, who must have felt very deeply, said it was hard to come there after so many years of persistent and successful effort to preside at what might be one of the last gatherings of that kind associated with the place. The College was the apple of his eye; it was, as it were, his first and only child, whose decease he now contemplated. There was no other institution to compare with it, there never had been anything of the kind before. The Professor spoke of the condition of things to-day, and declared that at the present time no two Londoners could lie down together, jealousies were rife, and the sinking of differences for a common good was almost unheard of.

No doubt there are a large number of Old Students of the College who would like to express their views or make practical suggestions with regard to the threatened closing of the College.

Selling Petrol at Excessive Prices

Messrs. G. Hodgkinson & Sons, motor agents, Market Place, Buxton, were proceeded against at Buxton Petty Sessions on Saturday for selling petrol at a price exceeding that fixed by the Profiteering Committee. Mr. Bromley, architect, of Retford, the complainant, stated that on September 4 he purchased from the defendants a gallon of No. 1 Shell petrol, for which he was charged 5s. He was told that that was the current price in the town, but on making inquiries he found that 4s. 3½d. per gallon was the correct charge. He reported the matter. Mr. Basil Ogden, town clerk of Buxton, who prosecuted by instruction of the Profiteering Committee, said the case was a serious one. The defendants admitted the offence and were fined £25 and costs.

Alleged Profiteering in Soda

Proceedings Against a Cardiff Firm

AT the North London Police Court on October 15, before Mr. Clark Hall, Mr. Louis Grayston Collins, manager of A. G. Collins & Brother, chemical and soda manufacturers, of Shamrock Works, Dumballs Road Docks, Cardiff, appeared to answer a number of summonses which had been issued at the instance of the Board of Trade under the Profiteering Act, and which alleged that the defendant had sold soda at a price which was unreasonable in view of all the circumstances. The defendant pleaded not guilty. Mr. Travers Humphreys appeared in support of the summonses on behalf of the Director of Public Prosecutions, and the defendant was represented by Mr. G. C. Kingsbury.

Mr. Travers Humphreys stated that there had been a most acute shortage of soda ash. The two great groups of firms who produced the soda ash were Messrs. Brunner, Mond & Co. and the United Alkali Co. Those firms had supplied retailers direct at £5 10s. a ton when the soda was packed in 2-cwt. bags, but when put up into smaller bags they charged £5 17s. 6d. a ton. Wholesale firms also purchased from the manufacturers and sold again to retailers at a profit. With regard to the present case a retailer named Mr. A. Coward, of Tyrrell Road, East Dulwich, complained to a local tribunal of the price he was charged for soda crystals by Messrs. J. Manger & Sons, Ltd., salt and soda manufacturers, of High Street, Kingsland, N. The complaint was duly considered by the proper committee, and Messrs. Manger & Sons were asked to explain how they came to charge 11s. a cwt. for washing soda. Their answer was that they only charged a reasonable profit on the price which they had to pay for the soda. They also stated that the firm from whom they obtained supplies was Messrs. A. G. Collins & Brother, of Cardiff.

Prices and Profits

Mr. Travers Humphreys said the defendant had informed the Complaints Tribunal by means of documents he forwarded that he had purchased soda from Messrs. A. J. Walker & Co. at £8 a ton and re-sold it at a profit of only 10s. a ton. No complaint of that transaction was made. He also bought 2 tons of soda from Messrs. Brunner, Mond & Co. at £5 10s. a ton and re-sold it to Messrs. Manger & Sons at £11 a ton. Most people would call that a profit of 100 per cent., but in trade it was desired to make the profit appear as low as possible, and therefore a trader always calculated his profit on his selling price. On that basis a profit of 50 per cent. was made, and the prosecution declared that it was outrageous. The defendant was not doing anything to the soda, he was not refining it and was not packing it. He resold at double the price at which he purchased, and it meant, of necessity, that the retailer would have to double his price to the public. That transaction formed the basis of the first summons.

On another summons it was alleged that the defendant obtained a further 2 tons of soda from Messrs. Jackson & Co. at £6 10s. a ton and he resold it at the slightly lower price of £12 10s. a ton. The prosecution suggested that for a middleman to take as his profit the difference between £6 and £12 10s. on a ton of soda was quite unreasonable and could not possibly be justified. A profit of 10s. a ton which the defendant appeared to have at one time made was the limit that could be justified. Another summons related to a purchase of 2½ tons of soda from Mr. Sydney Cohen, who traded as the John Bull Stores, at Cardiff. The defendant purchased soda in April last from Mr. Cohen at £9 a ton and resold at £12 10s. a ton. Counsel said he desired to say nothing whatever as to the propriety of Mr. Cohen having charged £9 a ton for the soda he sold to the defendant. A further summons also related to soda obtained from Mr. Cohen at £10 15s. a ton and resold at £13 10s. a ton.

Soda for Export

The documents in the case showed that Messrs. Jacksob & Co. and Messrs. Stranaghan & Stephens only made a reasonable profit on the soda they handled. When before the Tribunal the defendant stated that he thought Messrs. Manger required the soda for export, and therefore he was outside the Profiteering Act.

Mr. Herbert Alexander Manger, managing director of Messrs. J. Manger & Sons, Ltd., gave evidence.

Mr. Kingsbury: Did prices rise steadily from February to May?

Witness: Yes. We found that as time went on we had to pay more. It went up from £8 10s. to a high figure.

Other people were asking you the same price, or thereabouts, as the defendant required?—Yes.

So far as the price of £5 10s. a ton is concerned, it was no advantage to you, as you could not get any at the price?—No, we could not buy any.

Mr. G. Butler, sales manager to Messrs. Brunner, Mond & Co., stated that his firm and the United Alkali Co. practically controlled the manufacture of soda ash. They also manufactured soda crystals. Other firms purchased soda ash from them and manufactured the crystals. Since September, 1919, his firm and the United Alkali Co. had charged the uniform price of £5 10s. a ton. Retailers were supplied at that figure. They also supplied wholesale grocers, who charged a uniform price for the ordinary home trade. They fixed their price of £5 10s. a ton solely on the costs of manufacture. Messrs. Brunner, Mond & Co. were at one time exporters of soda, but they ceased to export on March 23, last.

Counsel: Were other persons exporting after that date?

Witness: No makers were exporting, but people were collecting material and exporting it. The home demand was so great that we decided to cease exporting altogether.

If you had known that the 2 tons was required by the defendant to resell at £11 would you have sent it?—No.

Replying to further questions, the witness said that his employers had rationed their customers all through the war and the system still obtained. Under the rationing system all customers received a percentage.

Counsel asked if there was any differentiation in the percentage allowed to customers, and inquired if it was correct that customers in the north received 50 per cent. of their previous supplies while those in the south only obtained 25 per cent.?

The witness said that nothing like that had taken place, and all customers had the same percentage as nearly as possible.

Counsel: Did it come to your knowledge that some people were getting very high prices for your soda?

Witness: Yes, I have seen such reports.

Were the prices obtained in that way the ruling prices in the trade?—Certainly not.

The mere fact that some persons were charging high prices for an article of which there is a shortage does not show that it is the ruling price?—No.

The Magistrate: What was the market price?

Witness: The manufacturers' costs, plus the reasonable profit of the retailer.

The hearing was adjourned.

Dyestuffs from Germany

REPLYING to Mr. Hogge in the House of Commons on Wednesday, Sir Philip Lloyd-Greame, Parliamentary Secretary to the Board of Trade (Hendon, C.U.), said:—The total quantity of synthetic dyestuffs, including intermediates, consigned from Germany, registered in the first nine months of this year, was 1,574 tons, valued at £1,399,027, of which 877 tons were received under the Reparation Clauses of the Treaty of Versailles. Details as to the quantities of chemicals imported from Germany are being compiled. No chemicals other than dyestuffs have been received from Germany by way of reparation.

Books Received

THE PHYSICAL SOCIETY OF LONDON. Vol. XXXII., Part V. London: Fleetway Press. Pp. 414. 4s. net.

HANDBOOK OF PATENT LAW OF ALL COUNTRIES. By W. P. Thompson. Eighteenth edition. London: Stevens & Sons, Ltd. Pp. 157.

PLANTATION RUBBER AND THE TESTING OF RUBBER. By G. Stafford Whitby. London: Longmans, Green & Co. Pp. 555. 28s. net.

Empire Conference on Motor Fuels

Colonial Sources of Power Alcohol

THE Imperial Motor Transport Conference organised by the Imperial Motor Transport Council was opened on Monday at Olympia, where the Commercial Vehicle Exhibition of the Society of Motor Manufacturers and Traders is being held this week. The proceedings opened with sittings of the Fuels Section. Sir George Beilby, Director of Fuel Research, Department of Scientific and Industrial Research, presided.

SIR G. BEILBY said that the recent developments in prices, not only of coal, but of all the oil and lighter products, had made them think more deeply of how they could get the greatest good out of the fuel they possessed. While they must not relax their efforts to produce more motor spirit, and as cheaply as possible, they must remember that motor spirit could be only a very small fraction of the fuel which would be available for the great purposes of the world. Therefore, many were turning their attention to coal, and other sources of fuel, as these might be made adaptable for purposes of motor transport.

Mr. E. S. SHRAPNELL-SMITH, chairman of the Empire Motor Fuels Committee, in a paper on "Motor Fuel Supplies and Prices: the Hastening of Remedies," said that large yields of fresh classes of motor fuels at greatly reduced prices must not be expected in the immediate or near future. The single possible exception was benzol, of which a potential extra volume of 30 million gallons per annum could be made available by shipping coal gas. The day might come when the Legislature would decide that the use of benzol from the gas supply for road transport was a national necessity. The law of supply and demand pointed to still higher prices for petroleum spirit, shale spirit, and benzol. The Committee's unanimous opinion was that power alcohol had the first claim on public attention, in order that a solution of the motor fuel problem might be provided within the Empire. The view of the Committee was that consumers should be provided with alcohol so mixed as to render it an interchangeable fuel with other standard fuels on the market. The shale industry contributed four to four-and-a-half million gallons of motor spirit per annum. If "cracking" were adopted in Scotland it was estimated that 20 million gallons could be produced. There was no evidence that the Kimmeredge shales in England could be worked commercially. If the Irish peat deposits were convertible to petrol or power alcohol we should have 150 years' supply, at the present rate of consumption, for the United Kingdom. But to realise this alluring prospect some method of dehydrating peat was essential. It was not improbable that a process for the artificial drying of peat might reach the stage of successful commercial application in the near future. No process was yet publicly known to exist for the ready conversion of tropical vegetation into power alcohol.

SIR JOHN CADMAN, Director of the Petroleum Department, discussing the conversion of coal into a more useful fuel, said that some years ago Sir William Ramsay suggested that instead of mining coal with a great expenditure of labour, an attempt should be made to gasify the coal *in situ*. The developments of petroleum had indicated that to-day they could literally riddle a country with holes.

Colonial Sources of Raw Materials

SIR F. NATHAN, Power Alcohol Investigation Officer to the Government, said it had been stated that the Fuel Research Board took perhaps too pessimistic a view of the possibilities of power alcohol. The ordinary sources of alcohol were materials which were found in foodstuffs, of which there was at present a shortage. They could only be used to make alcohol if they were produced in quantities far in excess of food requirements. The whole question of production oversea was receiving attention. A *questionnaire* had been sent to the Colonies, and he was receiving a series of replies which would provide a basis for consideration of the problem. Science might be able to devise some simple and cheap process for dealing with waste materials for the purpose of obtaining power alcohol. Rice straw existed in large quantities in India and Burma, and was a hopeful material for the production of alcohol.

MR. CANHAM, South Africa, said that in Natal power alcohol was extracted from molasses; Mr. W. H. LOBER (Australia) said there were great quantities of cactus and wild palm in that country available for the production of alcohol; and Mr. ARTHUR MYERS (New Zealand) suggested that a smal committee of scientific men should travel through the Empire to make investigations and report.

PROFESSOR W. A. BONE said he sometimes wondered whether they ought not to direct their energies to the designing of machines which would burn as fuel some form of compressed or solid fuel prepared from coal, and whether the straining after further supplies of liquid fuel was not pursuing a will-o'-the-wisp. In the British Empire, especially Australia and Canada, there were enormous potential resources of lignite, and the whole problem of lignite ought to be systematically investigated.

Mr. HAROLD MOORE read a paper on "Increased Production of Petroleum Motor Spirit." He said that the supply of petrol could be increased by cracking processes, but this would involve diminishing the supplies of such other products as kerosene, gas oil, and fuel oil.

Alcohol Mixtures for Fuel

Professor Dixon's Research Results

PROFESSOR DIXON, of Manchester University, reported to an audience at the Royal Automobile Club on Monday night the first result of the researches he has been conducting on alcohol as a motor fuel. Professor Dixon emphasised the fact that he was reporting on first results only, because the work was by no means finished, and he proposed to continue and present a complete report later on.

The object of the Manchester investigations, he stated, was to determine and compare the physical properties of alcohol and its mixtures in respect of vapour pressure, of ignition by external heat and by the heat of compression, the movements of the flame from the firing point, and of detonation. In the result, Professor Dixon pointed out, as might have been expected from previous work on cyanogen, etheylene and acetylene, that it was found that alcohol, ether, pentane and benzene all gave faster rates of detonation when mixed with oxygen insufficient for complete combustion. This is explained in part by the formation of carbon monoxide, either directly or indirectly, in the wave-front, while the formation of carbon dioxide is only possible where the flame is cooler—behind the wave-front; and possibly by the separation of free hydrogen when the oxygen is in defect. In the explosion of benzene with insufficient oxygen large quantities of finely divided carbon were deposited, some of the molecules probably breaking up by impact in the wave-front into free carbon and hydrogen.

"In the course of these researches," he continued, "it has been made clear that alcohol possesses most of the properties required in a motor fuel. As compared with petrol, its lower calorific value is almost compensated by the greater compression at which it can be used—and this property (of high ignition-temperature under compression) is hardly altered by admixture with 20 per cent. of benzene or of petrol itself. Such a mixture readily starts in the cold, and has been shown to run very smoothly and without knocking in an engine.

"I have not touched on the question of denaturing, but I would urge that the less methyl alcohol employed the better for the liquid as a fuel. By cutting down the wood spirit the strength of the explosion is increased, and it should not be necessary to maintain the present high proportion, since the nauseous state of crude wood-spirit is largely due not to the methyl alcohol itself, but to a small quantity of a less volatile constituent. I think there would be some advantage if one or two standard alcohol-mixtures were authorised, one of which could be used in existing engines with only slight adjustments. The skill of motor engineers would soon work out the most efficient designs for burning a standard power alcohol. If alcohol mixtures can be used for ordinary motor transport, saving 70 to 80 per cent. of other fuel, by so much will our limited resources of petrol and benzene be husbanded for the special services in which they cannot be replaced."

Well over 20 million gallons of petroleum were shown on the Custom House returns for a recent week. Importation at this rate is about three times the pre-war average. Of the quantity mentioned for that particular week nine million gallons were motor spirit, of which all except one shipment came from the United States.

Sale of Unascertained Goods

Action Against Agents by Thornett & Fehr

YUILLS, LTD., agents of the Queensland Meat Extract Co., were sued under the Arbitration Act on October 19, by Thornett and Fehr, in King's Bench Division of the High Court.

Under a contract in writing Yuills, Ltd., sold to Thornett and Fehr "200 tons (5 per cent. more or less)" of Australasian tallow of two specified brands, the tallow to be of "1919 make," and shipped in May and August, 1919. On the arbitrator's findings of fact, the Queensland Meat Extract Co. could have manufactured at Brisbane in 1919 had they chosen, but they did not do so. At Townsville they manufactured only 161 tons in 1919. Production at Townsville was stopped by a strike during part of the period between May and August, and the buyers elected to extend the time for delivery under a clause in the contract which gave them the right to do so. No further delivery was made, and the sellers contended in the arbitration proceedings that the contract was frustrated by matters which were not within their control, and that it must be taken as an implied term of a contract to deliver goods of "1919 make" that goods of that kind should be made in 1919. In any case, they contended that the limit of their liability for non-delivery was 29 tons, not 39, as claimed by the buyers, since they would have fulfilled their contract to deliver "200 tons (5 per cent. more or less)" if they delivered 190 tons.

The Lord Chief Justice stated that the main questions were whether there was in law any frustration of this contract; whether the quantity for which the seller could be made liable was "200 tons" or "200 tons (5 per cent. more or less,") *i.e.*, 190 tons. He said he was of opinion that there was no frustration. This was not a sale of specific goods, but of unascertained goods. When once it was decided that this is not a contract for ascertained goods, it is no answer that the goods contracted for were not manufactured, unless the seller expressly stipulated that he should not be liable in that event, whatever cause the failure to manufacture might be due. The next question was whether the arbitrator ought to treat the contract as one for 200 tons or as one for 190 tons or 210 tons, or any number of tons between those limits. The answer being that the contract was for the number of tons specified in the contract—namely, 200 tons (5 per cent. more or less). The seller had done all that he was legally bound to do if he delivered not less than 190 tons. Damages could only be for non-delivery of 29 tons, not 39 tons. The stipulation was for the benefit of the seller. The buyers were only entitled to damages for non-delivery of 29 tons.

Mr. Justice Darling and Mr. Justice Acton agreed.

Fire Insurance and Explosions

AN important appeal case came before the Judicial Committee of the Privy Council with regard to a judgment of the Court of King's Bench for Quebec (Appeal Side) in the matter of insurance, and the claims consequent upon a fire and explosions at a T.N.T. factory.

The appeals were from a judgment reversing decisions of Mr. Justice Maclennan, and the firms involved were Curtis's and Harvey (Canada), Ltd., (in liquidation) and Another v. The North British & Mercantile Insurance Co., Ltd.,—the same v. The Guardian Assurance Co., Ltd.

A fire took place in a building which was insured, and extended to an adjoining building in which there was some tri-nitro-toluol. Explosions occurred, and practically all the insured buildings were destroyed either by fire or explosions. The appellants sued on the policies for the whole amount. Respondents admitted liability for damage by fire, but not for damage by explosions. The insurance was against fire. Although the Trial Judge found for the appellants, the Appeal Court reversed that judgment and ordered an inquiry as to how much damage was caused by explosion and how much by fire.

After reviewing the circumstances and citing previous decisions, Lord Dunedin said that the parties must have contemplated the possibility of an explosion either as an incident to or as an originator of fire. When, therefore, the assured used words in his proposal and the insurer accepted in the policy words which were absolutely general and in no way limited, their Lordships thought that the more natural construction was to apply the words of exception to the whole risks in which explosion took a part rather than to confine them to the one special case provided for by Statutory Condition 11, to which no reference was made. In regard to other points in the case the insurers were warranted free from explosions of every sort except such explosion provided for by Condition 11. Now that condition only dealt with an explosion originating a fire, and did not deal with an explosion incidental to a fire. It followed that the present case was not touched by Statutory Condition 11, and the warranty free from explosion could have effect. The condition was not in itself unreasonable. Their Lordships thought that the judgment of the King's Bench, directing inquiry into the damages due to fire and explosion, should be affirmed. The respondents should have the costs of the appeals.

A Deal in Bleaching Powder

IN the Lord Mayor's Court last week, before the Recorder (Sir Forrest Fulton, K.C.), a claim was made by Mr. Thomas W. Watson, lately trading as Thomas W. Watson & Co., produce brokers and general merchants, 23, Eldon Street, against Mr. Mayer, of L. Jacobson & Co., Ltd., 75, Coleman Street, E.C., for £325, due under a guarantee dated July 3, 1919.

It appeared that at the time in question Mr. Watson was serving in the Army, while the business was carried on by his stepmother, Mrs. K. Watson. In the course of business she entered into a contract with L. Jacobson & Co., Ltd., in which company the defendant was the principal shareholder, for a quantity of bleaching powder. Proceedings were taken by Watson & Co. against L. Jacobson & Co., Ltd., by reason of a defect in the quality of the bleaching powder, and these terminated in judgment being signed by consent for Watson & Co. for £325. This occurred on June 4. In July, L. Jacobson & Co., Ltd., went into voluntary liquidation, the judgment of Watson & Co. having been proved against them. Certain of the shareholders of L. Jacobson & Co., Ltd., banded themselves together in order to take action against the company. The defendant then called upon Mrs. Watson, and requested her not to take further proceedings against the company, promising that in the event of the company's not paying he would pay the £325. He gave the guarantee dated July 3, which was accepted, whereupon Mrs. Watson instructed her solicitors to take no further proceedings. However, nothing had been paid by the defendant or by the company, and, after a demand for payment in March of this year, the present proceedings were brought. Evidence was given by Mr. A. C. Stanley Stone, C.C., senior member of the firm of Swepstone & Stone, Barber & Ellis, solicitors for the plaintiff, who said that his firm acted for the plaintiff in the proceedings against L. Jacobson & Co., Ltd. After judgment, the company went into liquidation, and he was approached by another solicitor with a view to the plaintiff joining in proceedings to make the defendant personally liable for acts alleged to have been done by him ultra vires. Shortly afterwards he received instructions from the plaintiff that he was not to proceed further with the matter, as Mr. Mayer had given a guarantee. After hearing further evidence, Mr. Willis, for the defence, said that the question was one for His Lordship, and rested upon the construction of the document. His (counsel's) submission was that the guarantee was a personal promise by the defendant to Mrs. Watson, and no one else could have any claim on the document besides the person to whom it was addressed. For the plaintiff it was argued that the guarantee had been made out in the name of the agent for Watson & Co. In the business transactions the defendant knew Mrs. Watson as the agent. The principle was laid down that a guarantee given to an agent for a debt due to a principal, or partner in a firm, could be sued upon by the principal or partner. The Recorder, after hearing the arguments, gave judgment for the plaintiff for the amount claimed, namely £325, and costs.

The Royal Humane Society's bronze medal was awarded on Tuesday to Arthur Lunn, an employee at a London vinegar brewery, for his attempt to save a workman who was suffocated in a vat containing carbon dioxide. Lunn was rescued from the vat unconscious.

From Week to Week

Deposits of barytes (99 per cent. barium sulphate) are being developed at Noarlunga, near Adelaide.

A body of platinum ore said to be 13 miles in extent has, according to report, been found in Cape Colony.

By 26 votes to 9 the Senate of London University on Wednesday decided to accept the Bloomsbury site offered by the Government.

Major W. F. Darke, B.Sc., M.C., of Bath, has been selected for a chemical appointment at the soap works of Christopher Thomas & Bros., Ltd., of Bristol.

A fire broke out on Saturday night at the mill of the Hullfold Dyeing & Raising Co., Whitworth, near Rochdale, and resulted in damage estimated at £100,000.

The Petrol Control Department, which has been kept open for some time for the purpose of dealing with refunds, will close finally on October 30.

A Santiago report states that the Minister of Finance has requested the German nitrate producers to disclose the details of a projected union of producers.

An addition has been made to the board of directors of the Explosives Trades, Ltd., by the appointment of Mr. H. J. Mitchell, the general manager of the company.

DR. J. NEWTON FRIEND has been appointed head of the chemistry department of the Municipal Technical School, Birmingham, in succession to Dr. T. Slater Price.

The property of the China Clay Corporation, Ltd., Ivybridge, Devonshire, was purchased for £47,000 by public auction in London on Wednesday, by Mr. Mallaby-Deeley, M.P.

Kingston & Stewart, Cannon Street, E.C., have appointed Mr. B. H. Knight as manager of their chemical department. Mr. Knight was formerly with A. C. Pearce & Co. (London), Ltd.

An illustrated booklet on "Superheat minus Pressure," describing the Byroe superheater, has been received by us from the Lofthouse Engineering Co., Ltd., of 5, Wine Office Court, E.C.4.

H.M. Commercial Secretary at Constantinople reports, by cable, that, as from October 4, salt has been removed from the list of goods of which the exportation from Turkey is prohibited.

Cambridge appointments include those of Mr. W. E. Dixon, of Downing, as Reader in Pharmacology, and Mr. S. W. Cole, (Trinity), University lecturer in Medical Chemistry. Both are re-appointments.

Mr. J. W. Gatehouse, the late public analyst for Bath, who died on Saturday, at the age of 79, was science master at King Edward VI.'s Grammar School in 1868, and held similar appointments at other local schools.

It is reported from Vancouver that a British Admiralty syndicate is negotiating for the purchase of nearly 2,000 square miles of territory in British Columbia, forming the largest smokeless steam coal deposit known in the world.

Jute Industrials (Ltd.), have acquired the whole of the ordinary shares of Cox Brothers (Ltd.), Camperdown Works, Dundee, probably the largest jute manufacturing concern in this country.

Buffalo University has received from Mr. O. E. Foster a gift of $400,000 for the erection of a chemistry building, and anonymous donations of $250,000 towards endowment and the cost of a library building.

We are asked to remind our readers that the Emil Fischer Memorial Lecture on October 28 will be delivered not at Burlington House, as previously stated, but at the Institution of Mechanical Engineers, Storey's Gate, S.W.

The death is announced of Mr. F. P. E. de Lalande, whose name is connected with the development of the technical use of hydrosulphites, and who is stated to have been the first to prepare purpurin by the oxidation of alizarin with manganese dioxide and sulphuric acid.

D.O.R.A. came into prominence once again on Saturday last when the Board of Trade issued three Orders, regulating respectively (1) the supply of coal to houses and factories; (2) the use of coal by gasworks; (3) the use of gas and electricity for lighting, heating, and power.

The polish factory of the Evergloss Co., Shoreybank, was practically gutted by a destructive fire which occurred at Darwen on Tuesday. The damage is estimated at several thousand pounds. Stocks of oil, turpentine, polishes and other inflammable materials were destroyed.

Rhys Thomas, commercial traveller, of Pontrhydycyff, was charged at Bridgend Police Court on Friday with embezzling sums of money amounting to £23, the property of his employers, Messrs. Osmond & Sons, Ltd., agricultural chemists, Grimsby. The defendant was fined £10.

An explosion took place on Sunday morning at Crosfield & Sons, soap and chemical works, Warrington. A workman named W. Gibbons was killed, and three others were seriously injured. A fire followed the explosion, but the flames were extinguished by the company's fire brigade.

According to Mr. Bonar Law, a Bill dealing with dumping is in course of preparation and will be introduced as soon as possible. In reply to Lieut.-Commander Kenworthy, who asked in the House of Commons, on Tuesday, whether there are not already enough restrictions on British trade, Mr. Bonar Law said "We do not regard our Bill a restriction on trade."

A letter has been addressed to the professors of arts and sciences in Germany by some of the professors of Oxford, desiring to dispel the embitterment of animosity which "may have passed between us." The letter is signed mostly by divinity scholars, and the names of chemical professors are notably absent.

A fine of £10 was imposed on the Newport Co-operative Society on Saturday, October 16, for selling baking powder containing 7½ per cent. excess of acid sulphate of lime. It was stated that 10 per cent. was allowed, but only 2 or 3 per cent. was generally used. The defence was that it was sold under warranty from a Manchester wholesale society. Notice of appeal was given.

An international combination of chemical workers has agreed to organise a congress to be held at Amsterdam. Most of the British workers in the chemical trade belong to unions affiliated with the National Federation of General Workers. The Federation executive are of opinion that every affiliated union should be represented at the congress, and representatives have been invited.

In his presidential address to the British Commercial Gas Association, Sir Robert Hadfield called for economy of the true sort. He said true economy did not consist merely in the cutting down of expenditure, but it implied also "the fruitful use of resources." In the afternoon session of the conference an address was read from Mr. D. Milne Watson, chairman of the Economy Section, who was unable to attend in person.

PROFESSOR F. KNOOP, of Freiburg, has been elected to the chair of physiological chemistry in the University of Leipzig, and Dr. H. Matthes to the ordinary professorship of pharmacy in the University of Konigsberg. Dr. F. Ehrlich and Dr. J. Meyer have been appointed ordinary professors of biochemistry and chemistry, respectively, at the University of Breslau, and Drs. E. Ebler and K. Mannich ordinary professors of inorganic and analytical and pharmaceutical chemistry, respectively, at Frankfort University.

The next meeting of the Society of Public Analysts will be held at the Chemical Society's Rooms at Burlington House on November 5, 1920, at 8 o'clock, when the following papers will be read:—"The Gravimetric Estimation of Bismuth as Phosphate, and its application in Ore Analysis," by W. R. Schoeller, Ph.D., and E. F. Waterhouse; "The Time Factor in Saponification," by P. J. Fryer, F.I.C.; "The Position of Analytical Chemistry in France," by Victor Cosman, F.I.C.; "Apparatus for Collecting Samples of Water at Great Depths," by W. T. Burgess, F.I.C.

It was reported at the annual meeting on Thursday of the Governors of the University College of South Wales and Monmouthshire that the most urgent need was the erection of new buildings for the departments of chemistry and physics, the plans for which have been approved. The approximate cost would be £176,000, in place of the pre-war estimate of £82,800, and a further sum of £141,799 was required. Following his gift of £25,000 for the erection of the Tatem Chemical Laboratory, the President (Lord Glanely) has transferred a further sum in War Loan to the College towards the erection of suitable premises for the Department of Agriculture.

References to Current Literature

British

ANTIMONY. The role of antimony in tropical medicine. R. G. Fargher. *J. Soc. Chem. Ind.*, October 15, 1920, p. 333 B.

COAL. The coal fire: an inquiry into the efficiency of domestic methods of coal consumption. *J. Soc. Chem. Ind.*, October 15, 1920, p. 334 B.

SODA AND SULPHATE. Theory of the preparation and recovery of soda and sulphate liquors; sodium compounds preparation; analysis of soda compounds; causticizers; recovery; evaporation on the surface; multiple effect evaporators; sulphate process. *Pulp and Paper Mag.*, pp. 1019-23.

MANURE. Analysis of droppings of caterpillar (*Antheræa cytherea*); comparison of horse, cow and kraal manures and caterpillar droppings. Dr. C. F. Juritz. *Chem. News*. October 15, 1920, pp. 181.

CHEMICAL ELEMENTS. Five main principles in the constitution and structure of the chemical elements. Hawksworth Collins. *Chem. News*, October 15, 1920, pp. 182-5.

LEAD ISOTOPES. Melting points and thermo-electric behaviour of lead isotopes; electrical measuring system and connections; thermo-electric behaviour of isotopes. T. W. Richards and N. F. Hall. *Chem. News*, October 15, 1920, pp. 185-7.

HELIUM. Canada as a source of helium; production of helium. *Chem. News*, October 15, 1920, p. 190.

CHROME. Effect of neutral salts on the basicity of chrome liquors. B. B. Dharale and S. R. Das. *J. Soc. Leather Trades Chem.*, September, 1920, pp. 225-30.

SULPHIDE. Estimation of sulphide; solutions required; distillation methods; accuracy of the method. J. E. Pickles. *J. Soc. Leather Trades Chem.*, September, 1920, pp. 231-5.

LIME. Caustic alkalinity of lime liquors. W. R. and J. Atkin. *J. Soc. Leather Trades Chem.*, September, 1920, pp. 236-42.

French

ARTIFICIAL PIGMENTS. Lakes for artificial pigments and their manufacture; lakes and pseudo-lakes of artificial colouring materials; lakes of soluble colours which are precipitated by metallic salts. M. de Keghel. *Rev. Chim. Ind.* September, 1920, pp. 267-74.

OIL. Synthesis of fatty acids from paraffins and other products of the fractionation of mineral oils; catalysts and the influence of temperature, pressure, agitation, time of reaction, presence of water or alkalies. P. K. Loffl. *Rev. Chim. Ind.*, September, 1920, pp. 278-282.

POTASH. Volumetric determination of sulphocyanates by potassium permanganate. M. R. Meurice. *J. Soc. Chim. France*, September 15, 1920, pp. 272-3.

TRINITRO-METAXYLENE. Solubility and crystallisation of trinitro-metaxylene in various solvents; characteristic of trinitro-*m*-xylene employed; determination of solubilities; action of aniline on trinitro-*m*-xylene. M. L. Devergnes. *J. Soc. Chim. France*, September 15, 1920, pp. 278-84.

United States

AMMONIA. Suggested equipment for the recovery of tar and ammonia in a small gas plant. A. I. Phillips. *J. Amer. Gas Ass.*, October, 1920, pp. 641-4.

NEW YORK EXPOSITION. Notes of a casual observer on the new developments featured by the exhibitors at the sixth national exposition of chemical industries. *Chem. and Met. Eng.*, October 6, 1920, pp. 653-5.

COAL TAR. American coal-tar chemical industry: its progress since 1919; adequate supplies of raw materials available; the anthracene problem; industry on peace basis; production of intermediates; output of intermediates derived from toluene; complex intermediates; anthracene derivatives—anthraquinone; production of dyes; indigo production; coal-tar medicinals; photographic developers. Grinnell Jones. *Chem. and Met. Eng.*, October 6, 1920, pp. 661-3.

CARBONIZATION. Whitaker-Pritchard process of destructive distillation; retort arrangements; findings from experimental tests; ammoniacal liquors. T. W. Pritchard. *Chem. and Met. Eng.*, October 6, 1920, pp. 664-6.

HYDROCARBONS. Nitration of hydro-carbons; some factors influencing velocity of nitration; reactive phase; sulphuric acid, solvent for water and nitro compounds; nitration operations; thermo-reaction; commercial nitrations. A. Hough, W. Savage and D. J. Van Marle. *Chem. and Met. Eng.*, October 6, 1920, pp. 666-70.

TALC. Talc in fire-resistant paint; trade name confusion; importance of new use of talc. R. B. Ladoo. *Chem. and Met. Eng.*, October 6, 1920, pp. 689.

FERTILIZER. Cyanamide loses value in fertilizers; boron and borax effects; analytical methods; potash; relation of fertilizer industry and chemistry. *Chem. and Met. Eng.*, October 6, 1920 pp. 693-4.

DYES. Some considerations on the testing of dyes in the leather industry. L. J. Matos. *J. Amer. Leather Chem. Ass.*, October 1920, pp. 553-7.

OILS. Analysis of sulphonated oils; suggested procedure as official methods of American Leather Chemists' Association. *J. Amer. Leather Chem. Ass.*, October 1920, pp. 595-9.

£100,000 for Research Work

Shareholder's Objection to Brunner, Mond & Co.'s Proposal

BEFORE Mr. Justice Eve in the Chancery Division on Friday last, Mr. William Wynn Evans, a shareholder in Brunner Mond & Co., moved for an injunction to restrain the company, until judgment in the action or further order, from paying or distributing £100,000 or any part of that sum by way of donation, or otherwise acting on a resolution passed at an extraordinary meeting of the company on August 5, 1920.

The resolution referred to was to authorise the directors to distribute £100,000 out of the investment surplus reserve fund to such universities or other scientific institutions in the United Kingdom which they may select for the furtherance of scientific education and research.

Plaintiff asked for the injunction on the ground that it was not within the scope of the memorandum and articles of association. The resolution was passed at an extraordinary general meeting and was carried by show of hands. The company was not engaged in general service, but in the chemical industry, and was a chemical manufacturing company.

In the directors' judgment the company's business required the scientific aid and trained assistants which, as a practical matter, could only be obtained from efficient schools and universities which should receive adequate financial support.

The question was how far that sort of theory should go. The directors proposed to assist institutions which not only dealt with chemistry but with other things. That was far further than the scope the memorandum required. To say that what the directors were about to do would be in the interest of the company was no justification for doing it outside the memorandum. The main object of the memorandum was that of carrying on a chemical manufacturing business.

The motion was allowed to stand over, and Mr. Justice Eve stated that he would advance the trail for action.

The Warehouse and General Workers' Union have called the attention of the Soap and Candle Industrial Council to dismissals at Lever Brothers' Works, Port Sunlight. The union complains that the firm has been engaging new men, but has so far given no undertaking to re-employ men whom it agreed in June to reinstate. Lever Brothers say: "The principle on which applicants for employment are engaged is, and always has been, the suitability of applicants."

Glasgow Corporation have accepted the following offers for supplying chemical plant: Redpath, Brown & Co., Ltd., three rolled-steam beams for acid tank supports at the Tradeston Chemical Works; Chemical Engineering & Wilton's Patent Furnace Co., Ltd., two steel chimneys and damper frames for tar stills and dehydrator at the Dalmarnock Chemical Works; Mechan's, Ltd., 14 mild steel trays for the sulphate of ammonia at the Dawsholm Chemical Works.

Patent Literature

Abstracts of Complete Specifications

151,024. FERTILISERS. J. R. Partington and L. H. Parker, Chemical Research Laboratory, University College, Gower Street, London, W.C.1. Application date, June 26, 1918.

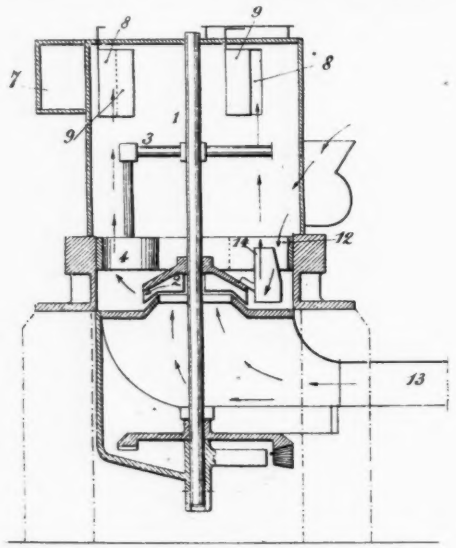
One part by weight of ammonium nitrate in the form of a dry powder is mixed with three parts of bone meal and the mixture ground. This mixture is not deliquescent and does not present difficulties in distribution when used as a fertiliser. Other materials such as potassium sulphate or chloride may also be added.

151,031. FURNACE WALLS. E. Bernitz, 716, East 3rd Street, South Boston, Mass., U.S.A. Application date, March 12, 1919. Addition to 119,599.

The furnace is of the type in which air is passed through a passage within the wall, and then through transverse openings in the furnace chamber. These openings are formed by partly cutting away the edges or sides of the bricks on the side of the air passage next the furnace. The openings may be of tapered cross-section. This construction enables the bricks to be laid more accurately than if the openings were formed by spacing apart ordinary bricks.

151,072. PULVERISING APPARATUS. J. Aubé, 63, Avenue des Champs Elysées, Paris. Application date, June 12, 1919.

A vertical shaft 1 carries a distributor 2 and radial arms 3 to which the spindles of loose grinding rollers 4 are pivoted. Material to be pulverised is introduced between the circular base 12 and the rollers 4, which bear against the grinding surface



151,072

by centrifugal force. A fan circulates air through openings 8 to a conduit 7, and the pulverised material is removed, the air being returned to the inlet 13. The air is distributed by the member 2 and the material is projected to the grinding zone by scoops 14. The fineness of the product is varied by varying the current of air by means of the dampers 9.

151,086. ACETALDEHYDE, PRODUCTION OF. M. Soller, of British Cellulose Manufacturing Co., Ltd., Spondon, near Derby, J. L. R. Hotz, 11, Cellulose Cottages, Spondon, near Derby, and British Cellulose and Chemical Manufacturing Co., Ltd., 8, Waterloo Place, London, S.W.1. Application date, June 14, 1919.

In the process for the production of synthetic acetaldehyde in which acetylene is passed into sulphuric acid solutions containing mercury compounds, the lead linings of the apparatus are liable to become amalgamated with mercury. This is prevented by electrolysing dilute sulphuric acid, using the vessel as anode; a protective coating of lead peroxide is thereby formed. The coating is dried and a second similar coating then applied.

151,098. CYANIDES, PRODUCTION OF. C. T. Thorssell and H. L. R. Lundén, 20, Köpmansgatan, Gothenburg, Sweden. Application date, June 20, 1919.

The process is for the production of cyanides by the action of nitrogen on a mixture of coal and alkali metals or alkaline earth metals at a high temperature in the presence of finely divided iron. The iron is added in the form of a compound containing no elements other than iron, hydrogen, oxygen, carbon and nitrogen, *e.g.*, iron oxalate or hydroxide. This compound is reduced to metallic iron by a preliminary heating to a temperature not exceeding 550°C. and the mixture is then transferred as quickly as possible into the reaction zone. Under these conditions the catalytic effect of the iron is at a maximum.

NOTE.—The following specifications which are now accepted were abstracted in THE CHEMICAL AGE when they became open to inspection under the International Convention: 128,578 (Commercial Research Co.), relating to chlorhydrins, bromhydrins or olefinic hydrocarbons, *see* Vol. I., page 312; 133,319 (C. P. Burgess Laboratories), relating to zinc chloride, *see* Vol. I., page 699; 135,847 (P. M. T. Saves), relating to calcium cyanamide, *see* Vol. II., page 159.

International Specifications Not yet Accepted

147,799. PAINTS. Dr. Plonnis & Co., 114, Kaiserallee, Friedenau, Berlin. (Assignees of R. Plonnis, Wilmersdorf, Berlin.) International Convention date, September 16, 1916.

Potash water glass is treated with 5-10 per cent. of caustic potash and mixed with chalk.

147,800. PAINTS AND CEMENTS. F. Bensa, 25, Piazza Fontane Marose, Genoa, Italy. (Assignees of L. Bizzi, Parma, Italy.) International Convention date, November 5, 1918.

A rust-preventing cement is prepared by mixing with linseed oil pyrites ashes which have been freed from sulphuric acid, pulverised, freed from silicic acid, and ground. The mixture may be diluted with boiled linseed oil to form a paint.

147,861. DISINFECTANTS. A. Franck-Philipson, Chicago, U.S.A. International Convention date, March 15, 1918.

Tar oil 7 parts is boiled with caustic soda of strength 40°Bé. 3 parts, and cocoanut oil or stearic acid 3·3 parts is added. Additional alkali sufficient to partly saponify the fat is added during boiling. Sodium or potassium oxalate may be added and the mixture allowed to set in moulds; it is soluble in water giving a disinfecting and cleansing solution.

147,904. MOULDING CELLULOSE ACETATE. Cellon-Werke, Dr. A. Eichengrun, 85, Wilmersdorferstrasse, Charlottenburg, Berlin. International Convention date, January 25, 1919.

To mould cellulose acetate, the finely divided material is mixed with very small amounts of volatile substances and subjected to a high pressure at a temperature just below its decomposition temperature. The material is allowed to cool under pressure. The pressure and temperature may be lower if 2-5 per cent, of water, alcohol, naphthalene or camphor is added. The pressed material may be disintegrated and pressed again.

147,905. FATTY ACIDS. H. Strache, 15, Theobaldgasse, Vienna. International Convention date, January 20, 1917.

The process is for converting aliphatic hydrocarbons in mineral oils, or the liquid or gaseous products of their distillation, or in liquid and gaseous products of the destructive distillation of coal, wood, peat, shale, shale oils or tar oils, or in carburetted water gas, oil gas, water gas tar, oil gas tar, lignite

tar, producer or coal gas, into fatty acids. The oils, &c., are first treated with sulphuric or hydrochloric acid to convert the unsaturated hydrocarbons into esters, which are then oxidised. Volatile fatty acids are distilled off with steam and the non-volatile acids are converted into soaps.

147,906-7. GLYCOLS. O. Matter, 33, Vorgebirgstrasse, Cologne. International Convention date, December 8, 1913, and April 21, 1915.

147,906. Ethylene chloride is heated and stirred with aqueous sodium bicarbonate and a copper catalyst, and the product is neutralised with acid and fractionally distilled. Glycol is obtained.

147,907. This is a Patent of Addition to 147,906. The process is modified by adding the ethylene chloride gradually to aqueous sodium bicarbonate or carbonate in an autoclave so that water is always present in large excess. A copper catalyst may also be added.

147,908. ETHYLENE CHLORIDE. T. Goldschmidt Akt.-Ges., 18, Salkenbergsweg, Essen, and O. Matter, 33, Vorgebirgstrasse, Cologne, Germany. International Convention date, May 22, 1915.

Ethylene in large excess is treated at 30°-120°C. with chlorine in the presence of a catalyst consisting of iron, copper, or antimony chloride. Ethylene chloride is formed and is separated by cooling the gas. The uncharged ethylene is returned for re-use.

147,909. ETHYLENE CHLORIDE. T. Goldschmidt Akt.-Ges., 18, Salkenbergsweg, Essen, and F. Bergius, 6, Jaegerstrasse, Berlin. International Convention date, February 29, 1916.

Coal gas or other similar distillation gas is treated with chlorine in presence of a catalyst to convert the ethylene content into ethylene chloride which is then separated by liquefaction obtained by compressing or cooling.

148,111. HYDROGENATION OF FATS AND OILS. C. & G. Muller Speisefeltfabrik Akt.-Ges., Neukolln, Berlin. International Convention date, February 6, 1919.

A catalyst suitable for the hydrogenation of fats and oils is obtained by treating nickel chloride solution with sodium carbonate and borax and separating the precipitate of nickel carbonate and borate. The precipitate is dried, heated to decompose the carbonate, and reduced in hydrogen. Alternatively, nickel protoxide is dissolved in hydrochloric acid, mixed with kieselguhr, precipitated with soda and borax, and the precipitate reduced. A cobalt salt may be used instead of the nickel salt.

148,122. ALKALI METALS, EXTRACTING. L. Hackspill and C. Staehling, Institut de Chimie, Rue Goethe, Strasbourg, Alsace. International Convention date, November 5, 1913.

Sodium chloride is mixed with calcium carbide and heated first in a vacuum to 350°C. and then to 800°C., when sodium distils off. Other alkaline earth compounds such as hydrides or silicides may be used. A high-quality lampblack is also produced.

148,126. TANNING AGENTS, SYNTHETIC. Chemische Fabriken Worms Akt.-Ges. (formerly Chemische Fabriken & Asphalt-werke Akt.-Ges.), 3, Taunus Anlage, Frankfurt-on-Main, Germany. International Convention date, July 20, 1916.

Two aromatic compounds are coupled, one of which is capable of coupling with diazo compounds and the other is not. The product is solubilised by acid groups during or after coupling. As an example, a mixture of phenol and sulphuric acid is heated, naphthalene sulphonic acid and phosphorus pentoxide are added and the mixture heated. The product is dissolved in water, filtered, and partly neutralised with alkali. Other examples and other condensing or coupling agents are described.

148,137. WOOD PRESERVATIVES. F. Bub, Petershagen, near Berlin. (Assignee of W. Lichty, Neustadt-on-Haardt, Germany). International Convention date, December 19, 1913.

A wood-preserving solution consists of mercuric chloride solution mixed with sodium fluoride, a fluosilicate, or a mixture of fluorine compounds and fluosilicates.

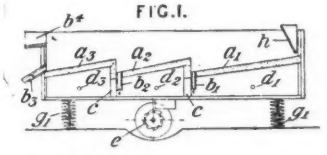
148,139. SYNTHETIC RESINS. H. Bucherer, 25, Wurttembergallee, Charlottenburg, Berlin. International Convention date, June 10, 1918.

The resinous condensation products from phenols and formaldehyde are rendered insoluble in alkali and soluble to a different extent in organic solvents, by substituting the free phenolic groups by alkyl, aralkyl, or acyl groups. In an example, *p*-toluenesulphonic ester may be prepared by means of *p*-toluenesulphochloride. Other examples describe the preparation of acetic and benzoic esters, a benzyl ether, a carbonic ester, and mixed ether-esters. The carbonic esters are practically insoluble in organic solvents and of high melting point. They may be produced on textiles *in situ* by impregnating with alkaline solutions of the resins and treating with phosgene.

148,168. SEPARATING ORES. H. Schranz, 24, Burgstrasse, Freiberg, Saxony. International Convention date, December 27, 1916.

Ore is fed from a hopper *h* on to porous stone carriers a_1 a_2, a_3, and water is supplied through pipes d_1, d_2, d_3 into separate chambers below, from which it passes upwards through the ore to classify it. The apparatus is vibrated by a cam wheel *e*,

FIG. I.



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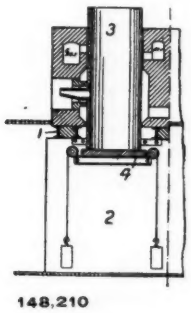
and the ore separates into horizontal layers. Heavy materia passes through pipes b_1, b_2, b_3 and lighter material flows off with the water through an outlet b^4. Several modifications are described, including one in which gas, acid, oils, &c., pass upwards through the porous plates, and the ore is floated off, leaving the gangue.

148,210. RETORT FURNACE FOR EXTRACTING ZINC. R. Von Zelewski, 22, Hohenzollernstrasse, Hennef, Germany. International Convention date, March 28, 1916.

A retort 3 for extracting zinc is mounted on a counter-



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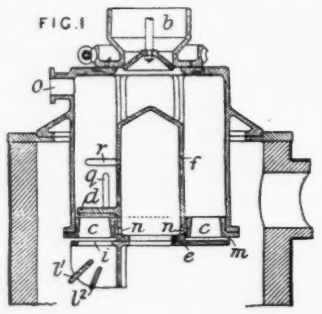
weighted platform 4 so that it may be lowered into the space 2 for removal or replacement. The furnace is built on girders 1 but may be removably mounted in a manner similar to that of the retort.

148,237. GAS MANUFACTURE. Akt.-Ges. fur Brennstoffvergasung, 4, Roonstrasse, Berlin. (Assignees of Ehrhardt & Sehner, Saarbrucken, Germany.) International Convention date, November 17, 1916.

The tarry constituents of bituminous coal are removed by a preliminary distillation at 450°C., and the coal is then used for the production of Mond gas.

148,239. GAS PRODUCERS. K. Linck, 11, Hochstrasse, Saarbrucken, Germany. International Convention date, February 2, 1918.

Coal is charged from a hopper *b* into a ring of cells *c*. A rotary shell *f* carries a cover *d* and a plate *e* with apertures above and below the cells *c* respectively. The cells *c* are filled



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when not covered by the cover *d*, and are discharged into the producer when the aperture *i* registers with a cell *c*. Distributing plates l^1, l^2 are provided below the aperture *i*. Producer gas passes through the space *m* into the hopper, and is withdrawn through outlet *o*.

148,242-3. FERTILISERS. Chemische Fabrik Rhenania Akt.-Ges. Aachen, Germany, and G. A. Voerkelius, Stollberg, Rhineland, Germany. International Convention dates, May 31, 1918, and April 12, 1919.

148,242. Phosphates are treated with nitric acid and an equivalent of potassium sulphate is added; a higher precentage of soluble phosphates is formed and the production of deliquescent calcium nitrate is avoided.

148,243. This is a Patent of Addition to 148,242. The potassium sulphate used in the above process is wholly or partly replaced by potassium magnesium sulphate, or by a mixture of ammonium sulphate with potassium magnesium sulphate, potassium sulphate or both. The amount of sulphate added may thus be reduced. The spreading of the fertiliser is facilitated if the sulphate is first mixed with the acid or the phosphate and then added to the remaining component.

LATEST NOTIFICATIONS.

152,002. Manufacture of multi-colour screens for natural colour photography. Faulstich, P. March 27, 1917.

152,009. Coke ovens and the like. American Coke & Chemical Co. October 3, 1919.

152,011. Method for the saving of heat in the production of ammonia from cyanides or cyanamides. Thorssell, C. T. October 6, 1919.

152,026. Treatment of leucitic rocks for the purpose of rendering available the potash contained therein. Blanc, G. A., and Jourdan, F. October 6, 1919.

152,031. Process for recovering nitrous vapours in form of aqueous nitric acid. Soc. L'Azote Francais. October 8, 1919.

152,289. Treatment of sulphide and oxidized ores. Hamilton, H. J. E. October 8, 1919.

Patents Court Cases

Application has been made under the Patents (Treaty of Peace) Rules, 1920, by the Ioco Rubber & Waterproofing Co., Ltd., of Netherton Works, Anniesland, Glasgow, for licences in respect of the following Patents: 1921/1908 (Insoluble condensation products of phenols and formaldehyde), 1922/1908 (Impregnation of wood and other fibrous materials), 21,566/1908 (Condensation product and method of manufacture), 26,614/1911 (Improved cardboard), 6,293-4/1912 (Varnishes and method of manufacture). All the above are in the name of L. H. Baekeland. Also 7,284/1915 (Dyeing or printing fabrics), in the name of P. M. Justice. (Bakelite Ges. m.b.H.). Any notice of opposition must be given before November 15, 1920.

Specifications Accepted, with Date of Application

124,759. Nitric acid, Production of. General Chemical Co. November 3, 1917.

132,229. Resin, Manufacture of. Koppers Co. September 6, 1918.

151,657. Colours soluble in fats and oils, and process of preparing the same. W. Clarke. (*Chemische Fabriken Worms Akt.-Ges.*) May 8, 1918.

151,684. Tricalcic phosphates, Mechanical treatment of. W. P. Thompson. (*Compagnie des Phosphates de Constantine*). June 14, 1919.

151,698. Argentiferous sulphide ores. Treatment of. F. E. Elmore. June 23, 1919.

151,707. Anthranol, Manufacture of. A. G. Perkin. June 26, 1919.

151,854. Thorium, Manufacture of. H. Wade. (*Lindsay Light Co.*) November 19, 1919.

151,868. Diphenylamine derivatives, Manufacture of. British Dyestuffs Corporation. J. Turner and L. G. Badier. December, 17, 1919.

Applications for Patents

Alby United Carbide Factories. Manufacture of fertilizers containing nitrogen and phosphate. 29,090. October 14.

Atack, F. W. Oxidation of hydrocarbons having side chains. 28,692. October 11.

Badische Anilin & Soda Fabrik. Production of soluble condensation products. 28,749. October 11.

,, Extraction of sulphur. 28,895. October 12.

Cassella & Co., L., and Herz, R. Manufacture of dye-stuffs. 29,096. October 14.

Dodd, A. H. Manufacture of fertilizers containing nitrogen and phosphate. 29,090. October 14.

Duckham, Sir A. M. (Woodall, Duckham & Jones). Furnaces for producing chemical changes. 29,104. October 14.

Farbenfabriken vorm. F. Bayer & Co. Process for obtaining sulphur or treating and purifying gases containing hydrogen sulphide. 29,215. October 15. (Germany, October 30, 1919.)

Farbwerke vorm. Meister, Lucius, & Bruning. Manufacture of therapeutically-active acridine derivatives. 29,106. October 14.

Foster, J. Method of producing oxygen and lime for agricultural purposes. 29,030. October 13.

Frood, H. Production and utilization of phenol-aldehyde condensation products. 28,929. October 13.

Glanzfäden Akt.-Ges. Process for producing spun material resembling wool or cotton from viscose solutions. 28,982. October 13. (Germany, March 27, 1918.)

Glover, S. Vertical retorts for destructive distillation of carbonaceous materials. 29,307. October 16.

Imray, O. (*Farbwerke vorm. Meister, Lucius, & Bruning.*) Manufacture of therapeutically-active acridine derivatives. 29,106. October 14.

Johnson, J. Y. (*Badische Anilin & Soda Fabrik.*) Production of soluble condensation products. 28,749. October 11.

,, (,,) Extraction of sulphur. 28,895. October 12.

Jourdan, F. Treating potassic rocks &c. for obtaining constituents in soluble form. 29,235. October 15.

Koppers, Co. Purification of liquids. 29,013. October 13. (United States, February 15, 1919.)

Lamkin, A. E. Liquid-fuel vaporizers. 28,754. October 11.

McEwen, S. Carbonization of subdivided fuel. 28,778. October 11.

Marks, E. (*U.S. Industrial Alcohol Co.*) Non-freezing fuel. 28,995. October 13.

Mond, A. (*International Precipitation Co.*) Electrical precipitation of suspended particles from gaseous media. 29,185. October 15.

Röhm, O. Depilation, neutralization, and bating of hides and skins. 28,904. October 12. (Germany, December 31, 1919.)

Sears, S. A. Regenerative chamber for furnaces using producer gas, &c. 28,816. October 12.

Sprengluft-Ges. Fuses for use with liquefied gases. 28,747. October 11. (Germany, February 18, 1916.)

West's Gas Improvement Co. Vertical retorts for destructive distillation of carbonaceous materials. 29,307. October 16.

The King has conferred the distinction of O.B.E. on Mr. Noel K. S. Brodribb, manager of the Australian Commonwealth Cordite Factory, and on Mr. August J. F. de Bavay, for services as a member of the Acetate of Lime Committee.

Exports of Chilean nitrate for the first half of October are reported by Henry Bath & Son, Ltd., to be as follows: Europe, 63,140 tons, against 27,540 tons in 1919; United States, 33,500 tons, against 33,130 tons; various, nil, against 15,490 tons. Cargoes and shipment f.a.s. Chili remain inactive. Of the latter coast buyers are reported at 14s. early shipment. Belgian retail market has been active at improving prices. French demand is quiet. Private estimation puts October production at 213,000 tons, a slight decline in comparison with the two preceding months.

Market Report and Current Prices

Our Market Report and Current Prices are exclusive to THE CHEMICAL AGE, *and, being independently prepared with absolute impartiality by Messrs. R. W. Greeff & Co. and Messrs. Chas. Page & Co., Ltd., may be accepted as authoritative. The prices given apply to fair quantities delivered ex wharf or works, except where otherwise stated. The weekly report contains only commodities whose values are at the time of particular interest or of a fluctuating nature. A more complete report and list are published once a month. The current prices are given mainly as a guide to works managers, chemists, and chemical engineers; those interested in close variations in prices should study the market report.*

Market Report

THURSDAY, October 21.

There is no information before us as we write as to any settlement having been made with the coal miners, and the dark cloud of industrial unrest which has settled upon the community is unbroken.

Markets naturally remain in an unsettled condition, but considering all things the comparatively small shrinkage in values is surprising.

There are advices from America that a decided improvement in the conditions there may be expected following the presidential election.

With few exceptions the present unsatisfactory position extends to export markets.

General Chemicals

ACETONE stocks are very much reduced and the price has a firmer tendency.

ACID ACETIC is a quietly easy market, with stocks passing steadily into consumption.

ACID CARBOLIC is in very small demand and is again rather easier in price.

ACID FORMIC is not in such strong inquiry, but as makers are well sold for some time to come lower prices are not expected.

ACID OXALIC is a little easier in price, and only a nominal business is passing.

ACID TARTARIC.—Whilst there is still some realisation of second-hand parcels, makers are inclined to expect an improvement in value consequent upon the reported shortage of and higher prices of raw materials.

BLEACHING POWDER.—Little business is likely to be possible for export whilst the coal strike continues.

COPPER SULPHATE, whilst past the worse, is still hanging fire, owing to the unsatisfactory exchanges.

FORMALDEHYDE is only in nominal demand, and the price is easy.

LEAD SALTS are not enquired for, and the price is nominal.

POTASSIUM PERMANGANATE appears to have reached an interesting level, and stocks seem very light.

POTASSIUM PRUSSIATE is in inquiry for prompt delivery, but parcels are difficult to obtain.

CAUSTIC SODA.—Secondhands are realising over-commitments of American make, and the price is inclined to be rather lower.

BICHROMATE OF SODA.—Some secondhand parcels are being offered at low rates, but there seems to be no change in the first-hand position.

SODA PHOSPHATE.—There has been no further reduction in price, but only small business is indicated.

SODA PRUSSIATE.—Little is offered by makers, but secondhand parcels change hands at recent values.

ZINC SALTS.—Reports show little doing.

Coal Tar Intermediates

There is little of interest to report, and very little new trade is being transacted. Many of the consumers will, of course, be affected by the coal strike, but on the other hand some of the manufacturers will be forced to close their works within the next few days if the strike continues.

ALPHA NAPHTHOL is in small demand, but without change in price.

ALPHA NAPHTHYLAMINE is moderately active at recent ruling rates.

BETA NAPHTHOL is in small request, and the price is dribbling owing to realisations on the part of secondhands.

DIMETHYLANILINE has been in request, but little spot material is available.

META-PHENYLENE-DIAMINE has been asked for, and some little business has been arranged.

PARANITRANILINE is on the quiet side, but value is well maintained.

RESORCIN is moving off very well at quoted figures.

SALICYCLIC ACID is stagnant, and the price is in buyers' favour.

Coal Tar Products

Our market position has been complicated by the coal strike, and the undermentioned prices must be taken as more or less figurative.

90's BENZOL remains at 3s. 10d. to 3s. 11d. on rails in the North and about 4s. in the South.

PURE BENZOL is worth about 4s. 2d. to 4s. 3d. and seems to be more plentiful.

CREOSOTE OIL remains unchanged at 1s. 1d. to 1s. 1½d. in the north and 1s. 2d. to 1s. 2½d. in the south.

CRESYLIC ACID is slightly more active and prices are 3s. 10d. to 4s. for dark, 95/97 per cent., with 4s. 6d. to 4s. 9d. for pale 97/99 per cent.

SOLVENT NAPHTHA is not worth more than 3s. on rails.

HEAVY NAPHTHA is showing signs of weakening, and is worth about 3s. 3d. to 3s. 4d.

NAPHTHALENE.—Crude qualities are selling at £14 to £24 per ton, while refined remains weak at about £50 per ton.

PITCH.—Business is active, and prices are unchanged.

Sulphate of Ammonia

There is nothing new to report.

Current Prices

Chemicals

	per	£	s	d.		£	s	d.
Acetic anhydride	lb.	0	3	9	to	0	4	0
Acetone oil	ton	90	0	0	to	95	0	0
Acetone, pure	ton	120	0	0	to	125	0	0
Acid, Acetic, glacial, 99-100%	ton	100	0	0	to	105	0	0
Acetic, 80% pure	ton	75	0	0	to	77	10	0
Arsenic	ton	100	0	0	to	105	0	0
Boric, cryst.	ton	74	10	0	to	76	0	0
Carbolic, cryst. 39-40%	lb.	0	0	10½	to	0	0	11
Citric	lb.	0	3	6	to	0	3	9
Fluoric	lb.	0	0	7½	to	0	0	8
Formic, 80%	ton	115	0	0	to	120	0	0
Gallic, pure	lb.		7	3	to	0	7	6
Hydrofluoric	lb.	0	0	8½	to	0	0	9
Lactic, 50 vol.	ton	58	0	0	to	60	0	0
Lactic, 60 vol.	ton	67	10	0	to	70	0	0
Nitric, 80 Tw.	ton	41	0	0	to	44	0	0
Oxalic	lb.	0	2	2	to	0	2	3
Phosphoric, 1.5	ton	65	0	0	to	67	0	0
Pyrogallic, cryst	lb.	0	11	6	to	0	11	9
Salicylic, Technical	lb.	0	2	0	to	0	2	3
Salicylic, B.P.	lb.	0	2	11	to	0	3	0
Sulphuric, 92-93%	ton	8	10	0	to	8	15	0
Tannic, commercial	lb.	0	3	6	to	0	3	9
Tartaric	lb.	0	2	8	to	0	2	9
Alum, lump	ton	19	10	0	to	20	0	0
Alum, chrome	ton	82	0	0	to	85	0	0
Alumino ferric	ton	9	0	0	to	9	10	0
Aluminium, sulphate, 14-15%	ton	17	10	0	to	18	10	0
Aluminium, sulphate, 17-18%	ton	20	10	0	to	21	10	0
Ammonia, anhydrous	lb.	0	2	2	to	0	2	4
Ammonia, .880	ton	43	0	0	to	45	0	0
Ammonia, .920	ton	30	0	0	to	32	10	0
Ammonia, carbonate	lb.	0	0	7½	to	—		
Ammonia, chloride	ton	95	0	0	to	100	0	0
Ammonia, muriate (galvanisers)	ton	60	0	0	to	65	0	0
Ammonia, nitrate	ton	55	0	0	to	60	0	0
Ammonia, phosphate	ton	120	0	0	to	125	0	0
Ammonia, sulphocyanide	lb.	0	3	0	to	0	3	3
Amyl acetate	ton	420	0	0	to	425	0	0
Arsenic, white, powdered	ton	80	0	0	to	82	0	0
Barium, carbonate, 92-94%	ton	12	10	0	to	13	0	0

	per	£	s.	d.		£	s.	d.
Barium, chlorate	lb.	0	0	11	to	0	1	0
Chloride	ton	28	0	0	to	29	0	0
Nitrate	ton	55	0	0	to	56	0	0
Barium Sulphate, blanc fixe, dry	ton	30	0	0	to	31	0	0
Sulphate, blanc fixe, pulp	ton	16	10	0	to	17	0	0
Sulphocyanide, 95%	lb.	0	1	6	to	0	1	8
Bleaching powder, 35-37%	ton	31	0	0	to	32	0	0
Borax crystals	ton	41	0	0	to	42	10	0
Calcium acetate, Brown	ton	20	0	0	to	21	0	0
,, Grey	ton	34	0	0	to	35	10	0
Calcium Carbide	ton	30	0	0	to	32	0	0
Chloride	ton	10	10	0	to	11	10	0
Carbon bisulphide	ton	65	0	0	to	67	0	0
Casein, technical	ton	75	0	0	to	80	0	0
Cerium oxalate	lb.	0	3	9	to	0	4	0
Chromium acetate	lb.	0	1	2	to	0	1	4
Cobalt acetate	lb.	0	8	6	to	0	9	0
Oxide, black	lb.	0	10	0	to	0	10	3
Copper chloride	lb.	0	1	3	to	0	1	6
Sulphate	ton	42	0	0	to	44	0	0
Cream Tartar, 98-100%	ton	225	0	0	to	230	0	0
Epsom salts (*see* Magnesium sulphate)								
Formaldehyde 40% vol	ton	0	270	0	to	275	0	0
Formusol (Rongalite)	lb.	0	4	9	to	0	5	1
Glauber salts	ton	Nominal.						
Glycerine, crude	ton	70	0	0	to	72	10	0
Hydrogen peroxide, 12 vols.	gal.	0	2	9	to	0	2	10
Iron perchloride	ton	50	0	0	to	52	0	0
Iron sulphate (Copperas)	ton	4	0	0	to	4	5	0
Lead acetate, white	ton	77	10	0	to	80	0	0
Carbonate (White Lead)	ton	61	0	0	to	63	0	0
Nitrate	ton	65	0	0	to	67	0	0
Litharge	ton	57	0	0	to	59	0	0
Lithopone, 30%	ton	48	0	0	to	49	0	0
Magnesium chloride	ton	15	10	0	to	16	10	0
Carbonate, light	cwt	2	15	0	to	3	0	0
Sulphate (Epsom salts commercial)	ton	12	10	0	to	13	0	0
Sulphate (Druggists')	ton	18	10	0	to	19	10	0
Manganese, Borate	ton	190	0	0	to	—		
Sulphate	ton	130	0	0	to	135	0	0
Methyl acetone	ton	95	0	0	to	100	0	0
Alcohol, 1% acetone	gall.	Nominal.						
Nickel sulphate, single salt	ton	60	0	0	to	62	0	0
Nickel ammonium sulphate, double salt	ton	62	0	0	to	64	0	0
Potassium bichromate	lb.	0	1	8	to	0	1	9
Carbonate, 90%	ton	115	0	0	to	120	0	0
Chloride	ton	50	0	0	to	52	0	0
Chlorate	lb.	0	0	9½	to	0	0	10½
Meta bisulphite, 50-52%	ton	260	0	0	to	270	0	0
Nitrate, refined	ton	65	0	0	to	67	0	0
Permanganate	lb.	0	3	6	to	0	4	0
Prussiate, red	lb.	0	4	0	to	0	4	3
Prussiate, yellow	lb.	0	2	0	to	0	2	1
Sulphate, 90%	ton	31	0	0	to	33	0	0
Salammoniac, firsts	cwt.	5	10	0	to	—		
Seconds	cwt.	5	5	0	to	—		
Sodium acetate	ton	50	0	0	to	52	0	0
Arsenate, 45%	ton	60	0	0	to	62	0	0
Bicarbonate	ton	10	10	0	to	11	0	0
Bichromate	lb.	0	1	2	to	0	1	3
Bisulphite, 60-62%	ton	50	0	0	to	52	10	0
Chlorate	lb.	0	0	5½	to	0	0	5½
Caustic, 70%	ton	32	0	0	to	33	0	0
Caustic, 76%	ton	34	10	0	to	35	0	0
Hydrosulphite, powder, 85%	lb.	0	4	6	to	0	4	10
Hyposulphite, commercial	ton	35	10	0	to	37	10	0
Nitrite, 96-98%	ton	85	0	0	to	86	0	0
Phosphate, crystal	ton	45	0	0	to	46	0	0
Perborate	lb.	0	2	2	to	0	2	4
Prussiate	lb.	0	1	2½	to	0	1	3½
Sulphide, crystals	ton	30	0	0	to	32	0	0
Sulphide, solid, 60-62%	ton	45	0	0	to	47	0	0
Sulphite, cryst	ton	15	10	0	to	16	10	0
Strontium carbonate	ton	85	0	0	to	90	0	0
Nitrate	ton	90	0	0	to	95	0	0
Sulphate, white	ton	8	10	0	to	10	0	0
Sulphur chloride	ton	42	0	0	to	44	10	0
Sulphur, Flowers	ton	19	0	0	to	19	10	0
Roll	ton	19	0	0	to	19	10	0
Tartar emetic	lb.	0	3	0	to	0	3	2
Tin perchloride, 33%	lb.	0	2	6	to	0	2	7
Perchloride, solid	lb.	0	3	0	to	0	3	3
Protochloride (tin crystals)	lb	0	2	0	to	0	2	1
Zinc chloride, 102 Tw.	ton	22	0	0	to	23	10	0
Chloride, solid, 96-98%	ton	60	0	0	to	65	0	0
Oxide, 99%	ton	61	0	0	to	62	0	0
Dust, 90%	ton	90	0	0	to	92	10	0
Sulphate	ton	21	10	0	to	23	10	0

Coal Tar Intermediates, &c.

	per	£	s.	d.		£	s.	d.
Alphanaphthol, crude	lb.	0	4	0	to	0	4	3
Alphanaphthol, refined	lb.	0	5	0	to	0	5	3
Alphanaphthylamine	lb.	0	3	6	to	0	3	9
Aniline oil, drums extra	lb.	0	1	8	to	0	1	9
Aniline salts	lb.	0	1	10	to	0	2	0
Anthracene, 85-90%	lb.		—		to		—	
Benzaldehyde (free of chlorine)	lb.	0	5	9	to	0	6	0
Benzidine, base	lb.	0	13	6	to	0	14	0
Benzidine, sulphate	lb.	0	10	6	to	0	11	0
Benzoic acid	lb.	0	4	0	to	0	4	3
Benzoate of soda	lb.	0	4	3	to	0	4	6
Benzyl chloride, technical	lb.	0	2	0	to	0	2	3
Betanaphthol benzoate	lb.	0	14	0	to	0	14	6
Betanaphthol	lb.	0	4	0	to	0	4	3
Betanaphthylamine, technical	lb.	0	11	6	to	0	12	6
Croceine Acid, 100% basis	lb	0	5	0	to	0	6	3
Dichlorbenzol	lb.	0	0	6	to	0	0	7
Diethylaniline	lb.	0	7	9	to	0	8	6
Dinitrobenzol	lb.	0	1	4	to	0	1	5
Dinitrochlorbenzol	lb.	0	1	5	to	0	1	6
Dinitronaphthaline	lb.	0	1	6	to	0	1	8
Dinitrotoluol	lb.	0	1	8	to	0	1	9
Dinitrophenol	lb.	0	2	9	to	0	3	0
Dimethylaniline	lb.	0	5	9	to	0	6	0
Diphenylamine	lb.	0	5	0	to	0	5	3
H-Acid	lb.	0	14	6	to	0	15	0
Metaphenylenediamine	lb.	0	5	9	to	0	6	0
Monochlorbenzol	lb.	0	0	10	to	0	1	0
Metanilic Acid	lb.	0	7	6	to	0	8	6
Monosulphonic Acid (2:7)	lb.	0	7	6	to	0	8	0
Naphthionic acid, crude	lb.	0	5	0	to	0	5	6
Naphthionate of Soda	lb.	0	6	0	to	0	6	3
Naphthylamin-di-sulphonic-acid	lb.	0	5	6	to	0	6	6
Nitronaphthaline	lb.	0	1	6	to	0	1	8
Nitrotoluol	lb.	0	1	3	to	0	1	4
Orthoamidophenol, base	lb.	0	18	0	to	1	0	0
Orthodichlorbenzol	lb.	0	1	1	to	0	1	2
Orthotoluidine	lb.	0	2	6	to	0	2	9
Orthonitrotoluol	lb.	0	1	3	to	0	1	4
Para-amidophenol, base	lb.	0	12	6	to	0	13	0
Para-amidophenol, hydrochlor	lb	0	13	0	to	0	13	6
Paradichlorbenzol	lb.	0	0	6	to	0	0	8
Paranitraniline	lb.	0	8	0	to	0	8	3
Paranitrophenol	lb.	0	2	9	to	0	3	0
Paranitrotoluol	lb.	0	5	9	to	0	6	0
Paraphenylenediamine, distilled	lb.	0	13	6	to	0	14	6
Paratoluidine	lb.	0	8	6	to	0	9	6
Phthalic anhydride	lb.	0	4	9	to	0	5	0
R. Salt, 100% basis	lb.	0	4	0	to	0	4	2
Resorcin, technical	lb.	0	11	6	to	0	12	6
Resorcin, pure	lb.	0	17	6	to	0	18	0
Salol	lb.	0	5	3	to	0	5	9
Shaeffer acid, 100% basis	lb.	0	3	6	to	0	3	0
Sulphanilic acid, crude	lb.	0	1	8	to	0	1	9
Tolidine, base	lb.	0	10	6	to	0	11	6
Tolidine, mixture	lb.	0	3	0	to	0	3	6

Cardiff By-Products Market

October 6.

Sulphate of Ammonia—	
For home consumption (per ton o.t.)	£24 d./d.
For export (per ton f.o.b.)	£30 to £40
Benzol, 90's (per gallon)	3s. 5d. to 3s. 10d.
Benzol, 50's (per gallon)	3s. 5d.
Solvent Naphtha (per gallon)	3s. to 3s. 6d.
Heavy Naphtha (per gallon)	3s. 6d.
Crude Naphthalene Salts (per ton)	£16 to £26
Pitch (per ton)	£10 to £11
Creosote (per gallon)	1s. 2d. to 1s. 4d.
Motor Benzol (per gallon)	3s. 5d. to 3s. 10d.
Crude Benzol (per gallon)	1s. 2d.
Toluol Benzol (per gallon)	4s.

Alsatian Potash

ALSATIAN potash salts are now in good demand for application to grass land and for the autumn planting. Large stocks of French kainit, 14-15 per cent., French potash manure salts, 20-22 per cent., and French muriate of potash are available at the principal ports in the United Kingdom.

The death took place on Tuesday, as the result of an accident, of Sir Cornelius Neale Dalton, late Comptroller-General of Patents, at the age of 78.

Company News

LEVER BROTHERS LTD.—In our last issue we referred to Lever Brothers' issue of 4,000,000 Eight per Cent. Cumulative Preference shares. This has now been fully subscribed.

EXPLOSIVES TRADES.—The proposed new issue by Explosives Trades will take the form of 8 per cent. seven-year notes, to be offered at the price of 96½, the amount being £3,000,000.

STANDARD OIL CO.—This company is forming another in Paris which will be affiliated to the American concern. Plans are being made for large works to facilitate distribution to both the army and civil consumers. Directors of the Compagnie Standard Franco-Americaine, representing the Standard Oil interests, are Mr. A. C. Bedford, president of the Standard Oil, Mr. E. T. Bedford, director of the Standard Oil in Europe and Messrs. W. Oswald and P. Hurll. The French group is represented by MM. Jules Cambon, ambassador, Horace Finaly, general manager, and Jules Rein, of the Banque de Paris et des Pays Bas, Holtz, and Bondonneau. M. Jules Cambon has been elected chairman, and Mr. A. C. Bedford vice-chairman.

KERN RIVER OILFIELDS OF CALIFORNIA.—For the year ended May 31 last the gross profit amounted to £304,423, against £286,664, to which is added £83,536 brought forward. Excess profits duty absorbed £19,219, and the profit dervided from McLeod Lease (held in suspense) was £128,779. After providing for depreciation, &c., and American income tax, there is a balance of £163,122. The directors propose to appropriate to general reserve £7,500, the same, and to write off the cost of the new issue £795. A final dividend of 12½ per cent. (making 17½ per cent. for the year, against 15 per cent.) is proposed, leaving to be carried forward, subject to excess profits duty, £50,318, of which £8,617 is on behalf of the St. Helens Company.

ROYAL-SHELL PETROLEUM.—An Amsterdam report states that the German "A. G. fur Petroleum Industrie" (A.P.I.) has increased its capital from 1,150,000 marks to 25,000,000 marks. The Royal-Shell group (Bataafsche Petroleum My) is to have taken a large participation, but not the majority of shares. The company owns factories for oil distillation, refining of oil and petrol, factories of fats, and an organisation for distribution. They are situate in Hamburg (free port), Emmerich, Nurnberg, Muenchen, Cosel in Silesia, Brunswick, Mannheim, &c. The company is connected with the "Deutsche Bergin A.G." (for exploitation of the Bergius treatment for refining petrol), and the "Braunkohlen Produkte A.G." in Berlin. The board of the A.P.I. is constituted as follows: Mr. De Kok (Royal-Shell), Dr. C. H. Guepin (Dutch Trading Co.), Count Kraft Henckel von Donnersmarck, Dr. Theo Goldschmidt (Essen), and bank director Goldschmidt (National Bank of Germany).

LEVER BROTHERS AND THE AFRICAN CORPORATION.—An extraordinary general meeting of the shareholders of Lever Brothers, Ltd., is called for November 5 in connection with the proposed amalgamation between the African and Eastern Trade Corporation and the West African interests of Lever Brothers (Limited) Modifications of the original agreement include the doubling of the winding-up value of the ordinary shares, which will be £2 instead of £1 for every £1 of present or converted ordinary capital, and a guarantee has been given by Lord Leverhulme for a payment of the full 15 per cent. dividend on the new preferred ordinary shares for the entire year. The capital reorganisation scheme provides for the cancellation of 2,000,000 unissued ordinary shares and 1,000,000 unissued "B" preference shares, and the capital will be brought up to £16,000,000 by the issue of 5,000,000 new preferred ordinary shares and 4,000,000 ordinary shares by the capitalisation of reserves.

W. H. DORMAN & CO., LTD.—The ordinary general meeting of W. H. Dorman & Co., Ltd., was held on October 15 at Stafford. Mr. Walter Haddon, chairman and managing director, presented the director's report, an account of which was published in THE CHEMICAL AGE last week (p. 434). In his speech the chairman spoke of the new method adopted by the firm of adapting power wave transmission to tools. The announcement made within the last few weeks has created universal attention. He said Dormans have designed and manufactured a series of practical tools which prove transmission of energy through water is now a commercial proposition, being power saving, reliable, safe, and highly efficient. The equipments are simple in their construction, free of expensive metals, and low in maintenance costs. Mechanical devices in coal getting are not so numerous as in other trades of corresponding importance. This state of affairs is explainable through the many dangers arising from an extensive use of electricity in underground workings in the majority of mines. Up to the present time the only alternative power unit has been compressed air, which is impossible in the majority of mines owing to lack of the necessary space. If the space were available the fact remains that the low efficiency of 10 per cent. or a loss of 90 per cent is commercially an impossible proposition, and as such can never solve the problem of getting coal by mechanical means to relieve consumers and manufacturers of this increasing burden of higher fuel charges. The ideal solution of this pressing problem is to make use of wave transmission in conjunction with electricity as the motive power at the top of the shaft, or from the existing electric power house, when complete safety from all risks of explosions or fires can be absolutely guaranteed. A satisfactory "stoping" drill has never been evolved that could be worked successfully in stopes and narrow workings, and as a result the bulk of such work throughout the world is still to-day performed by the laboriously slow hand methods. These wave power tools are indicative of the many applications useful and important which are needed in many industries to-day, and which are all now available by reason of the developments of this new engineering science, the result of your company's pioneering efforts. The directors have decided that it is to the best interests of the present proprietors to raise additional funds by the issue of a new series of short-term notes at a definite rate of interest, plus a valuable participating right similar to the participating rights now enjoyed by the cumulative preference shareholders. They are also offering a small portion of the unissued ordinary share capital at a premium, warranted, in their opinion, by the records of the company and the future outlook. The report and accounts were unanimously adopted, and the dividends as recommended in the report were declared. The retiring directors and the auditors having been re-elected, a vote of thanks was passed to the chairman, and the proceedings terminated.

Chemical Trade Inquiries

The following inquiries, abstracted from the "Board of Trade Journal," have been received at the Department of Overseas Trade (Development and Intelligence), 35, Old Queen Street, London, S.W.1. British firms may obtain the names and addresses of the inquirers by applying to the Department (quoting the reference number and country), except where otherwise stated.

LOCALITY OF FIRM OR AGENT.	MATERIALS.	REF. NO.
Calcutta ...	Petrol; paraffin	489
British Columbia	Turpentine. Replies to the Canadian Government Trade Commissioner's Office, Portland House, 73, Basinghall Street, London, E.C.2.	—
Cape Town ...	Red Oxide Paint; soap; anti-fraction grease. Replies to the Dept. of Overseas Trade, 35, Old Queen Street, Westminster, London, S.W.1.	
Cairo	Glass	496
Cologne ...	Oils for soap manufacture ...	538
Guayaquil ...	Paints; cement	523
Jugo-Slavia ...	Chemical products...	536
Roumania ...	Chemicals	540
Spain ...	Glass	515

Loftine, Limited, announce that they have transferred their business from St. Paul's Street, Leeds, to more extensive and convenient premises, Alpha Mills, Ilkley, to which address in future all communications should be addressed, and which will be the registered office of the company.

Commercial Intelligence

The following are taken from printed reports, but we cannot be responsible for any errors that may occur.

London Gazette

Bankruptcy Information

DIAMANT, SAMUEL, 51, Castellain Mansions, Elgin Avenue, London. Chemical merchant. First meeting October 26, at 11 a.m., Bankruptcy Buildings, Carey Street, London, W.C.2. Public examination January 12, 11 a.m., Bankruptcy Buildings, Carey Street, London, W.C.2.

Companies Winding Up Voluntarily

PACIFIC PHOSPHATE CO., LTD. (in voluntary liquidation). A meeting of creditors will be held at Sutherland House, 3, Lloyds Avenue, London, on Wednesday, October 27, at 11.30. A. R. Dickinson, Liquidator.

PORT TENNANT CHEMICAL CO., LTD. (in voluntary liquidation).—A general meeting of members will be held at Salisbury House, London, Wall, London, E.C., on Tuesday, Novemeber 30, at 12 noon. H, Ferguson, Liquidator.

SESTRON COLOUR OXIDISING CO., LTD. (in voluntary liquidation).—A general meeting of members will be held at the office of Crosby Syndicate, Ltd., 4, Broad Street Place, London, E.C.2, on Thursday, November 25, at 10 a.m. T. D. Jones, Liquidator.

VENEZUELAN OILFIELDS EXPLORATION CO., LTD. (in voluntary liquidation).—A general meeting will be held at 48, Cannon Street, London, on Tuesday, November 16, at 11 a.m. J. W. Creasser, Liquidator.

Liquidator's Notices

JAPANESE EXPLOSIVES CO., LTD. (in liquidation).—A general meeting will be held at the offices, of the company 38/39, Parliament Street, Westminster, S.W., on Wednesday, November 17, at 3 p.m. Mr. S. McA. Walker,

SCIENTIFIC GLASS CO., LTD.—A meeting of creditors will be held at Lloyds Bank Chambers, Collingwood Street, Newcastle-on-Tyne, on Monday, October 25, at 3 p.m. T. E. Rowell, Liquidator.

Mortgages and Charges

[*NOTE.—The Companies Consolidation Act, of 1908, provides that every Mortgage or Charge, as described therein, created after July 1, 1908, shall be registered within 21 days after its creation, otherwise it shall be void against the liquidator and any creditor. The Act also provides that every Company shall, in making its Annual Summary, specify the total amount of debts due from the Company in respect of all Mortgages or Charges which would, if created after July 1, 1908, require registration. The following Mortgages and Charges have been so registered. In each case the total debt, as specified, in the last available Annual Summary, is also given—marked with an *—followed by the date of the Summary, but such total may have been reduced since such date.*]

BRITISH COLOUR PRINTING CO. (1920), LTD., London, E.C.—Registered October 4, £10,000 debentures, to J. F. Roberts, 56, Ludgate Hill, E.C.; general charge.

NORTH OF ENGLAND CHEMICAL WORKS, LTD.—Registered October 4, mortgage debenture securing all moneys due or to become due, to Barclays Bank, Ltd.; general charge. *Nil. September 14, 1920.

TAR OILS, LTD., Dunstable.—Registered October 9, £10,000 debentures (filed under sec. 93 (3) of the Companies (Consolidation) Act, 1908), present issue £3,600; general charge. *Nil. May 18, 1920.

TAYLOR'S DRUG CO., LTD., Leeds.—Registered October 5, £1,600 mortgage, to Mrs. E. Speight, 101, Harrogate Road, Leeds, widow, and ors.; charged on dwelling houses in Brighouse. *£69,985. 13s. 5½d. January 12, 1920.

Satisfaction

MILLBROOK BLEACHING & FINISHING CO., LTD.—Registered October 8, £50,000 debentures (filed under sec. 93 (3) of the Companies (Consolidation) Act, 1908); general charge; also registered October 8, mortgage for securing all moneys due or to become due, to the Belfast Banking Co., Ltd., as collateral security; charged on lands, hereditaments, water rights and other rights and premises situate in Ballykeel, and elsewhere in Antrim. *Nil. November 7, 1919.

Bill of Sale

[*The undermentioned information is from the Officia Registry. It includes Bills of Sale registered under the Act of 1882 and under the Act of 1878. Both kinds require re-registration every five years. Up to the date the information was obtained it was registered as given below; but payment may have been made in some of the cases, although no notice had been entered on the Register.*]

FOURNAISE, JAKE PETERSON, 845, High Road, Leytonstone, acetylene plant manager. Filed October 12. £100.

MORRISEY, J., 86, Moorfield Road, Crow Wood, Widnes, caustic soda fireman. Filed October 18, £30.

County Court Judgments

[*NOTE.—The publication of extracts from the "Registry of County Court Judgments" does not imply inability to pay on the part of the persons named. Many of the judgments may have been settled between the parties or paid. Registered judgments are not necessarily for debts. They may be for damages or otherwise, and the result of bona-fide contested actions. But the Registry makes no distinction of the cases. Judgments are not returned to the Registry if satisfied in the Court books within twenty-one days. When a debtor has made arrangements with his creditors we do not report subsequent County Court judgments against him.*]

FARNSWORTH, RICHARD (sued as a firm), Lumsdale, Matlock, bleachers. £115. 8s. 2d. August 19.

ANDERSON, J. W., 35, Queen Street, Keighley, oil merchant. £25. 12s. 6d. September 15.

New Companies Registered

The following have been prepared for us by Jordan & Sons, Ltd., company registration agents, 116 and 117, Chancery Lane, London, W.C.:—

HOME PETROLEUM COMPANY, LTD.—Manufacturers and refiners of oils. Nominal capital £125,000 in 500,000 shares of 5s. each. Minimum subscription, seven shares. Directors: A. Armitage, J. A. Chown and Sir G. L. L. B. Prescott. Qualification of directors £100. Remuneration of directors £500 each. Chairman £1,000.

PRIESTMAN, HARTLEY & CO., LTD., 8, Prince Street, Hull.—Drysalters. Nominal capital, £3,000 in 3,000 sharss of £1 each. Directors: W. Hartley, F. B. Priestman, F. Prietsman, J. E. Rusby (per directors). Qualification of directors, £200.

FL. BOURGEOIS,

18/19, Great St. Helen's, LONDON, E.C. 3.

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GUM MASTIC (finest quality).
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CHROME YELLOW.
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